November 1977

Smithsonian

Caterpillar resorts to chemical warfare on wasp in sequence from prize documentary (p. 80)

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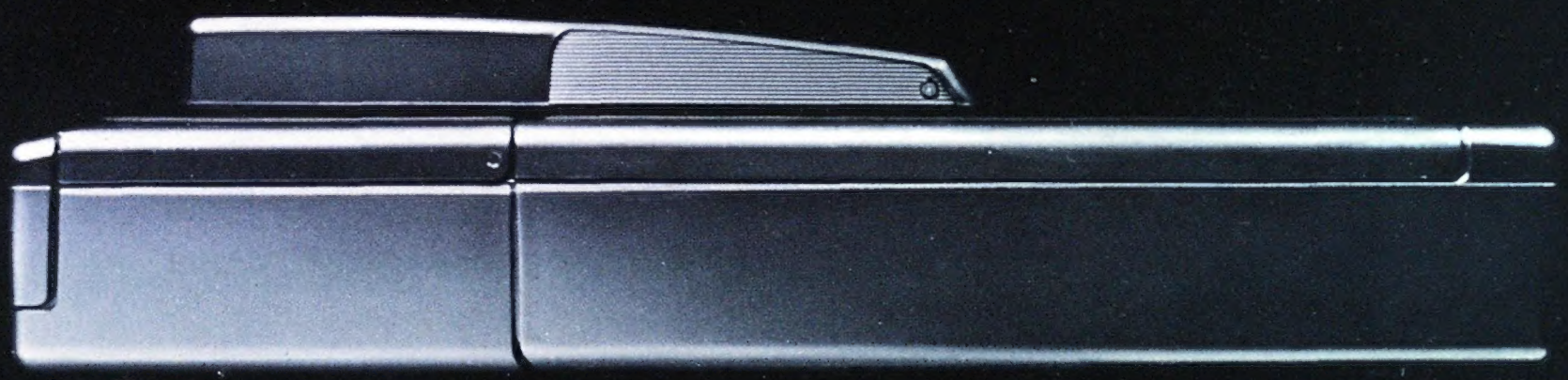

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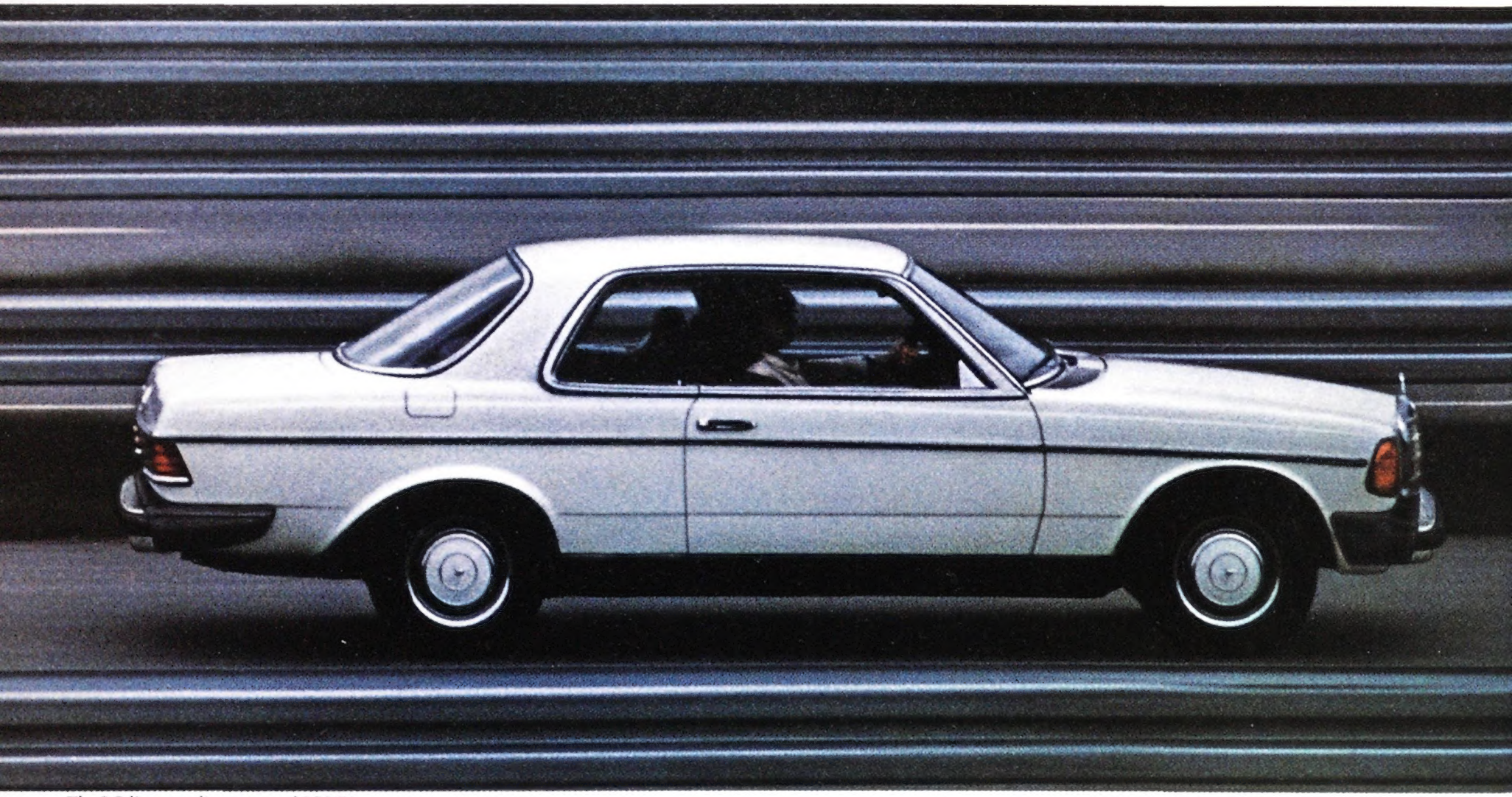
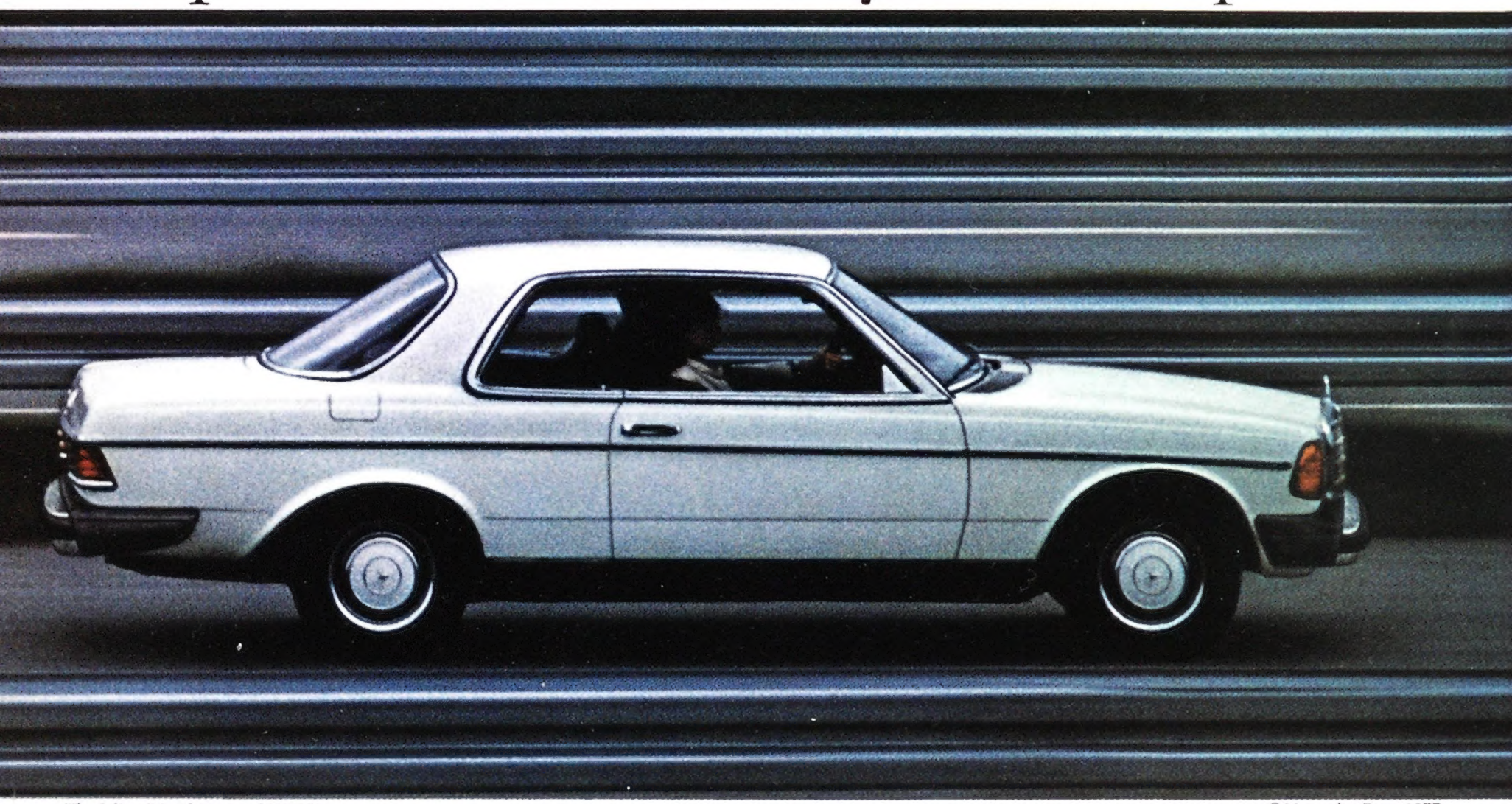
Mercedes-Benz announces a new Coupe



The 2.8-liter gasoline-powered 280CE.

plus an extraordinary new Coupe



The 3-liter Diesel-powered 300CD.

© Mercedes-Benz 1977

The new Coupe
is the 280CE and it is powered by a fuel-injected, 2.8-liter Six.

The extraordinary new Coupe
is the 300CD, and it merits the term by introducing Diesel power to a class of Mercedes-Benz from which Diesels were previously excluded.

Thus the Mercedes-Benz Diesel has fully come of age. It stands today at such a peak of refinement that a limited-production Diesel sports Coupe is not sacrilege but logic. Meanwhile, savor your new luxury of choice.

No boulevard sports car

Gasoline- or Diesel-powered, this new Coupe is no faddish "personal" car but a lithe five-passenger machine you will prize as much for its quick reflexes as for its elegant lines.

You sit cradled within a wheelbase of only 106.7 inches, less than a foot longer than the close-coupled 450SL Roadster. You should find yourself negotiating even tight mountain curves with a sense of ample road to spare, slipping through city traffic like a fish. Chances are, within a few days you will stop having to envy sports car drivers forever.

But family men can rest assured. There is not only a full rear seat but a rear seat that nearly equals the 280E Sedan for headroom. And there is not only a full trunk but a trunk with the same 12.6 cubic feet of space as the 280E.

Some people don't understand how Mercedes-Benz builds such space-efficient cars. Mercedes-Benz doesn't understand how to build anything else.

Worth its weight in strength

The new Coupe's taut profile is aerodynamically "clean." Put under an X ray, it would be revealed as the skin over a steel cage welded at 4900 points to a steel platform, forming a monocoque structure.

The engineers braced that sheet-steel floor with cross members to help stiffen the midsection. And although the side windows are pillarless, the concealed "B" pillar provides additional structural integrity.

Straight-line braking stability

Engineers and not stylists are the heroes behind the Coupe. If this 1¾-ton, five-passenger machine seems to corner flatter and grip the road more tenaciously than you're accustomed to, credit them.

They in turn would credit technological nuggets like fully independent suspension, and *zero offset* steering with straight-line stability, *even* in panic stops.

Panic stops are further softened by 4-wheel disc brakes. Mercedes-Benz would never build a Coupe or any other car without them.

But *handling brilliance* is only half the tale. The other half is the ride: Over-the-road decorum worthy of an expensive motor car. *A clue:* The shock absorbers' lower chambers are pumped full of *nitrogen* gas as an extra cushion against vibration.

Power assists a purist can love

No brute force is needed to pilot your Coupe about. Power steering, power brakes, and a 4-speed automatic transmission slightly smoother than the human hand are standard features. Wives will approve. And so will driving purists—because these laborsaving devices have been designed to preserve driving "feel" at all costs.

Not a superficial ounce of chrome

Doors over four feet wide swing open to reveal a meticulously ordered cockpit. Electric windows, bi-level climate control and AM/FM stereo radio are all built in, but the mood is less opulent than crisply businesslike.

For instance, the interior has no dazzling chrome knickknacks to confuse the driver's field of vision. Glare-free gauges are placed so you can check them without breaking visual contact with the road.

The anatomically contoured twin front seats are thickly padded, their springs tuned to the car's suspension. The backrests lock in place *pneumatically.*

And the walnut-root veneer that trims the instrument panel and covers the console is *real* walnut-root veneer.

A delicious dilemma

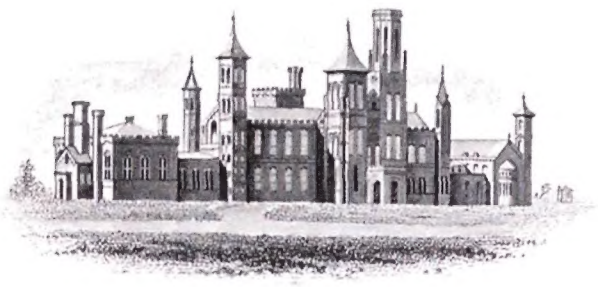
Which engine version belongs in your Coupe?

Classicists will feel most at home with the 280CE and the familiar traits of its gasoline power plant—supple and responsive in the sporting Coupe manner. And hardly a mundane choice: The 280CE marks the zenith of Mercedes-Benz six-cylinder engine development.

The 300CD allows Coupe devotees to combine their love for elegance with common-sense motoring, and Diesel devotees to combine their love for common-sense motoring with elegance. The power of its 5-cylinder engine is one surprise, the lack of noise and roughness is another. That it offers the established advantages of a Diesel should be no surprise.

But there is ultimately only one way to decide which Coupe best suits your needs. See your Mercedes-Benz dealer and experience them both.

The view from the castle



Watching the wild geese you have reared
in your own pond is reward enough
for a life as a 'backyard conservationist'

When I visited Litchfield, Connecticut, last May, I was delighted to hear once again the unique low, moaning call of our male Ross' Geese as they moved about rapidly over the grass, making short threatening rushes at other males from time to time. Ross' Goose was named as a new species in 1861 by John Cassin in honor of Bernard R. Ross, chief factor of the Hudson Bay Company, who found fragments of the bird at Great Slave Lake. It is a diminutive white bird with black flight feathers, not much larger than a Mallard. However, its longer pink legs and short, stubby, triangular pink bill identify it as a goose. This is the loveliest of the North American geese. To my mind, the small species are more beautiful than the large, though hunters and those who favor *eating* geese might disagree. For that matter, the hunters of geese can go their way and I'll go mine, for we may not agree—ever.

My first Ross' Geese came to our rearing ponds at Litchfield when the Fish and Wildlife Service sent me some wing-tipped, crippled birds in 1947, shot on the Sacramento National Wildlife Refuge in California. The species is protected, but it is easy to mistake in flight for the much larger and more abundant Snow Goose, which winters by the hundreds of thousands in the central valleys west of the Sierras. I have been a collaborator with the Fish and Wildlife people since World War II, and they were generous in those days with sharing such cripples in the hopes of captive rearing. Waterfowl rearers—backyard conservationists—are a small, hardy breed; they belong to a world group of tinkerers and hobbyists, with a special knack for working with living things.

Ross' Geese on a pond are endlessly charming: the male guarding the nest, making rushes at all and sundry, proud and bold, actually squeaking and attacking you if you come too close; the female sitting very watchfully on her nest, rounded and flattened, head gathered in to her breast. Once the gander has made his little run, he returns to his mate, stands near her, and utters his triumphant call, that strange, drawn-out "awnkh-h-h." The description is next to impossible, for the sound—though peculiar—is not unpleasant, but actually rather haunting.

We were lucky this year, for we had four nests, from which we reared five birds. Five tiny fluffballs of goslings, three in yellow down, two grayish-white, a special character of Ross' babies. This species, unlike most other geese, may have downy young in both colors. The parents, nesting over, by now have flocked up again and gone quiet.

My favorite time to watch our little flock is at dusk. Eddies of vapor rise off the pond. The adult Ross' with their feathered young, now turned rather dingy in their first molted plumage, move as a flock over the ground or on the water, back and forth, turning as in a drill, commands unheard. They move fast, in the same way as they do in flight, for these are fast flyers on the Sacramento Refuge, their wingbeats noticeably rapid compared with the lumbering flight of the Snows. As it grows dim, the light failing, the birds appear like wraiths, joining with the mist in an eerie progression over the water, the occasional moaning call sounding of far places and an ancient time.

S. Dillon Ripley

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"The only gusher I'll ever see is at the movies."

Gulf Production Superintendent Bob Valentine perforates a legend. "I don't think I ever saw an oil movie where they didn't have a gusher. Everybody gets greasy, and they laugh a lot.

"But today the only gushers are in the movies, not in real life. And a good thing, too. All that oil spraying all over the landscape. All those tools and pipe flying around—a man could get killed that way.

"The fact is that wells just don't come in as gushers anymore.

The easy oil is gone

"One reason is that drilling and well-completion technology has improved. These days, we bring the oil to the surface under carefully controlled conditions, in order to avoid spillage.

"Another reason is that the easy oil is gone. We're drilling deeper—sometimes as deep as 20,000 feet. We're drilling in tough, inaccessible, out-of-the-way locations we wouldn't have attempted ten years ago.

Wet rock

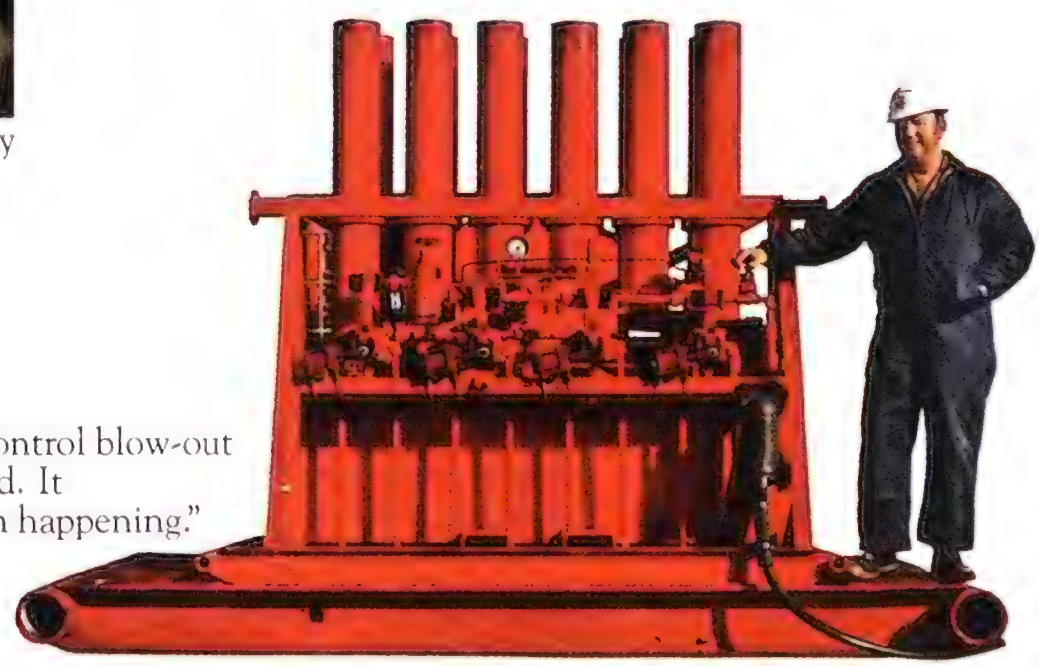
"These days, an oil strike is a lot less dramatic. At the end of a successful drilling operation, your best indication of oil may be a wet rock. The oil is in the pores of the rock, and you sometimes have to do some incredible things to get it out. Stimulation with chemical solutions; fracturing at eight or ten thousand pounds' pressure; or steam injection flooding.

"These days, getting the oil out is a real challenge. But we've got the tools and the knowledge, and we'll do it."

Gulf

Gulf people: meeting the challenge.

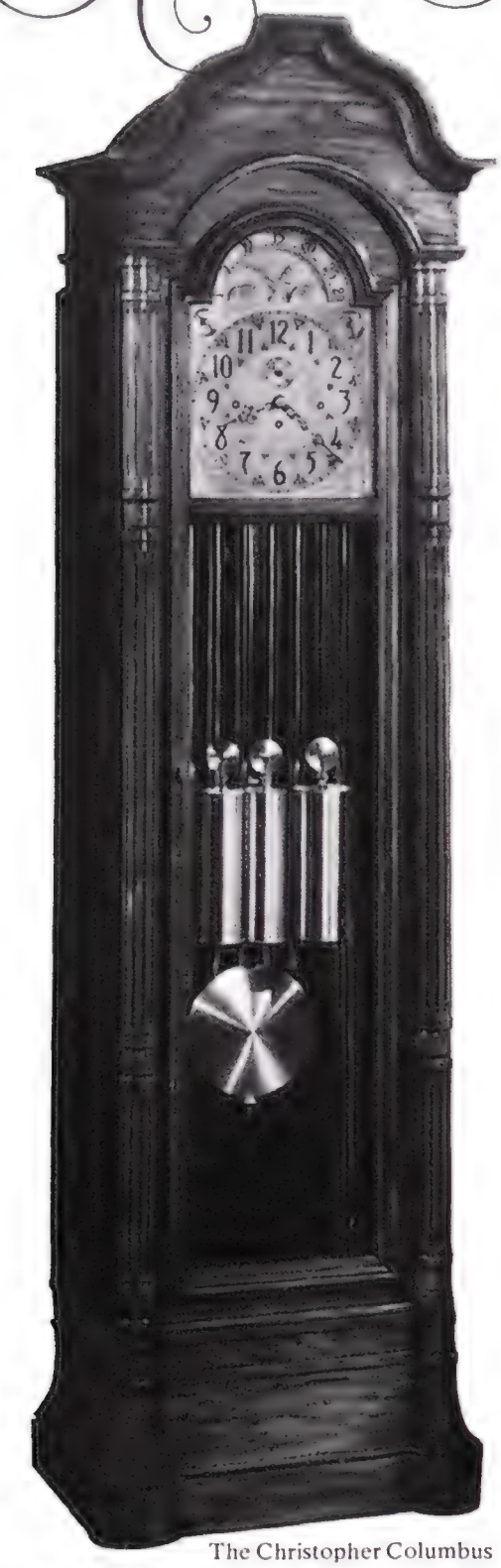
"A modern oil strike: rock with oily pores."



"This is a remote control blow-out preventer manifold. It keeps gushers from happening."

Gulf Oil Corporation

Herschede



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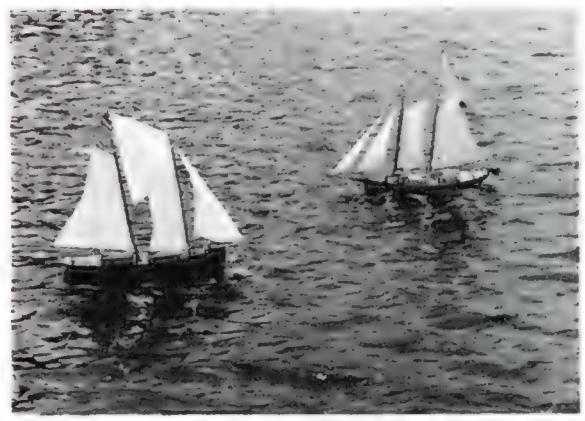
Around the Mall and beyond

While gleaming 12-meter yachts were racing off Newport, Rhode Island, last summer, aiming toward the challenge for and defense of the *America*'s Cup, a bitterly contested match race was roiling the waters of the reflecting pool below the Capitol at the eastern end of the Mall. This was the struggle for the James Smithson Challenge Cup. It was held with considerable ceremony, followed closely by the media and sailed by two flamboyant skippers. These features duplicate the affair off Newport.



Centennial (left) and *Emma C. Berry*

But there were differences. The Smithson Cup vessels are about four feet overall, as opposed to 65-to-70 feet; their captains control them by radio instead of by growling orders to crews of muscular young men; they cost a pittance instead of several million dollars. Also, they are produced and sailed not by some of the world's most elite yacht clubs, but by staff members of the Smithsonian.

Ben Lawless, assistant director for exhibits at the Museum of History and Technology and builder-skipper of the vintage 1876 New York pilot boat *Centennial,* and Porter Kier, director of the Museum of Natural History and captain of the schooner *Emma C. Berry* of similar vintage, came to the line at a steaming summer noontime, bottoms cleaned, decks cleared, sails trimmed and radio transmitters ahum with vibrancy. After a great deal of racing around by the committee boat (a power cruiser, also radio-controlled) and of setting out handmade buoys by a barefooted young spectator and of jockeying for a windward position at the start, the "gun" went off—not the thud of a starting cannon, but the clack of two boards smacked together—and away they went.

As in any sailing race, all friendship

Porter Kier (left) and Benjamin Lawless

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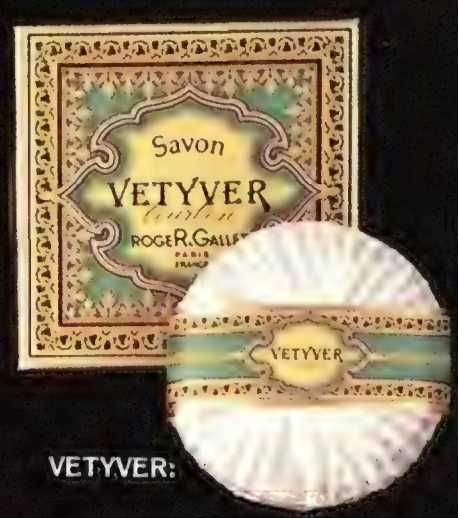

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and association between the rival skippers vanished instantly. Instead of sitting amiably side by side, antennae poised, as they were before the start, Captains Kier and Lawless separated and engrossed themselves in their own guidance systems. From then until the finish their only communication with each other consisted of such nautical politesse as, "Clear out of my way, you swab!"

The two vessels battled down to the buoy, rounded it, then headed back for the line. *Emma C. Berry* was trapped in a small bay in the pool where the wind went flukey on her. *Centennial* took the lead. *Berry* tried to tack out and got caught in irons. *Centennial* surged farther ahead. Kier grumbled that Lawless had *Centennial* on a string. *Berry* got a good wind shift, swept out of the bay, sails filled and lee rail down, caught *Centennial* and shot across the line in front.

With the usual graciousness of racing skippers, Lawless and Kier made their statements about the race.

Captain Kier of the victorious *Emma C. Berry:* "A splendid and well-deserved triumph by the better ship and the better skipper."

Captain Lawless of *Centennial:* "I don't think Kier was at the same race. Anyone who had been there would have instantly recognized who was really the better skipper. Sure, his boat was faster, but it was built from a kit, not from honest old lines, scrupulously followed with enormous skill. *Anyone* can use a kit."

Captain Kier: "Bunk!"

They agreed on one thing. They will both be building skipjacks for the next challenge, and the Smithson Cup will remain in contention between the two of them. "The cup will remain with me forever," said Kier, demurely. "Also there's a free lunch which is supposed to go with it. And which has not yet been supplied for this year."

"I shall have no trouble winning the cup next time," said Lawless, meekly. "Nor in keeping it in perpetuity."

While these members of the Smithsonian staff were thus filling their spare time, the people at the National Air and Space Museum were putting together the Smithsonian Frisbee Festival. Here, master champions of Frisbee throwing (SMITHSONIAN, September 1976) showed their stuff; Martha Faye, the renowned Frisbee-catching dog—a Labrador—leaped as high

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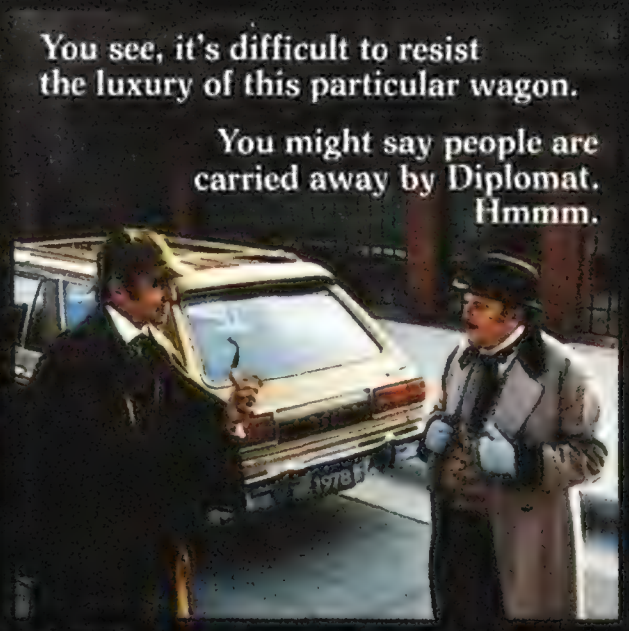
as six feet to snag Frisbees hurled by her master, John Pickerill; and a match of soccerlike Ultimate Frisbee had the Mall rocking with cheers.

Michael Collins, Director of the Air and Space Museum, was given a record-breaking Frisbee. It had won the indoor distance title by soaring 284 feet. This Frisbee takes its place, said Collins, in the collection along with the *Spirit of St. Louis*, the Wright Flyer, the Apollo XI spacecraft, the Lilienthal glider and all the other antique planes, rockets, satellites, balloons, kites and similar identified flying objects. As a matter of fact, the West Gallery of the museum is being redone next year with a new exhibit about flying for fun. This will include flying discs—Frisbees.

Sound trivial to you? Like playing with toys? Well, Mel Zisfein, Deputy Director of the National Air and Space Museum and a top aerodynamicist, went to the festival, got intrigued when a dog named Wombat presented him with a warm, wet, red Frisbee, chucked it out for Wombat to snag in midair, and began wondering why the thing works the way it works. Phone calls to friends at MIT, Princeton, NASA and Johns Hopkins produced a lot of embarrassed admissions that no one seems to know much about Frisbees. Mel has since become so interested that he's turned members of his own staff loose on the trail of the Frisbee and promises a full disclosure next month. Suffice it to say now that the disc is a gyroscope with lift.

As for those radio-controlled boats, they make use of a cheap and simple version of the same sort of guidance system that steers unmanned spacecraft. If you put together these two "toys"—one displaying gyroscopic principles and the other remote guidance—you find yourself right up there with the big kids, fooling around with sophisticated modern technology. Toys indeed!

Model boats and planes, of course, are invaluable museum devices, for they capsulize knowledge. If they can be made to float or fly or race, so much the better. I would love to see, someday, an accurate scale model of the Wright's plane, authentic in every detail save for radio guidance, make a similarly scaled-down duplicate of the first flight at Kitty Hawk, only this time right down the middle of the Mall.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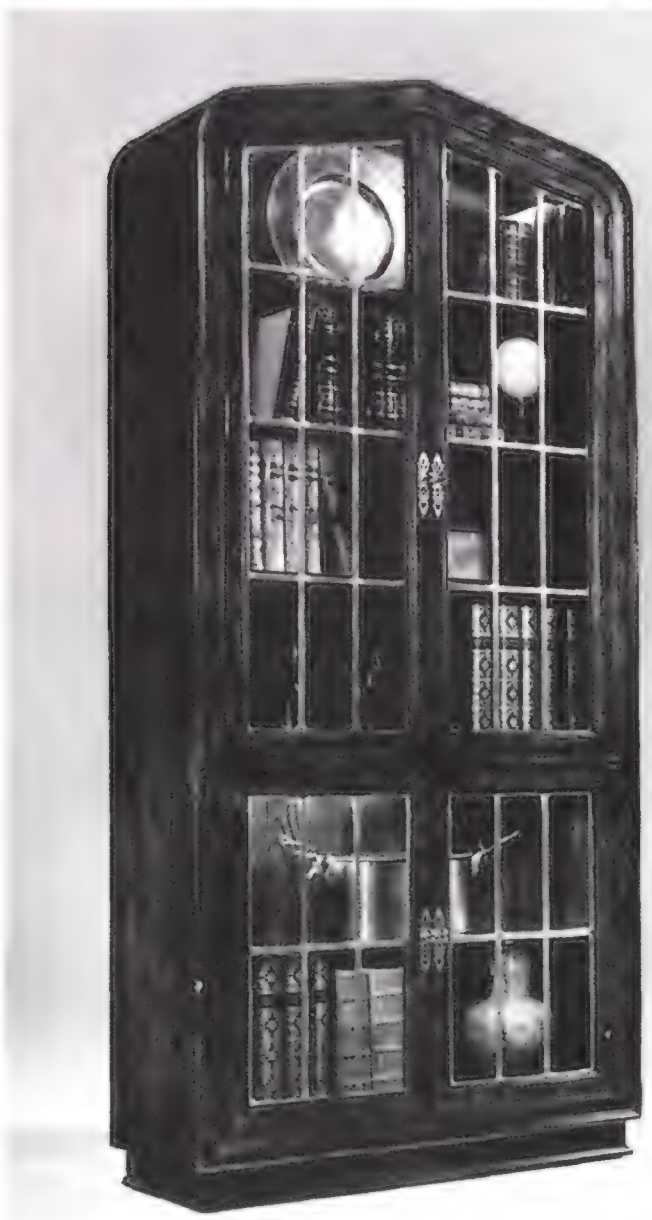

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One of the Smithsonian's best ship models is that of the colonial ship *Brilliant* in the Museum of History and Technology. She was not an extraordinary vessel, but she typified the whole genre of late-18th-century trading ships. That being reason enough, her model plunges along on its stand.

Among the people on her pitching deck are the mate, a windblown woman and her child. They are all looking up at something—it appears to be the starboard end of the main-course yardarm, where the sail is furled. Their interest in this spot seems odd because an area of the vessel's waterline planking has been removed to show her inner construction—frames and knees and deck beams—and you have the feeling that the people should be looking *down*, not up, to discover why they are sinking.

The Cooper-Hewitt Museum in New York (p. 68) is planning to open an exhibition about subways this month—in, of all places, the subway. They're using the mezzanine at the subway station at 42nd Street and Avenue of the Americas to show, with images and artifacts, how a subway system is a reflection of its metropolitan culture—and vice versa.

This opens on the 21st, and the Cooper-Hewitt people are determined to keep graffiti out of it. Can they do so, I wonder, without destroying their basic concept? Everyone knows that graffiti are *part* of New York.

At last I have word for those who expressed interest in Big Red, the drunken pigeon. I saw him again, the other day. He has moved away from the Museum of History and Technology with its small but tempting puddles of spilled beer and has migrated across the Mall. I met him in the shadow of the castle, going about his business with the utmost probity. I felt regret. When plastered, Big Red was quite charming. Sober, he's just another damn pigeon.

Another point about that column. A correspondent writes that the unpopped popcorn kernel that shattered my tooth is called an Old Maid. And my dentist says that it wasn't a molar, it was a bicuspid. He also says I not only didn't spell his name right, I didn't mention it. That is a sorry oversight. He's a good dentist.

—Edwards Park

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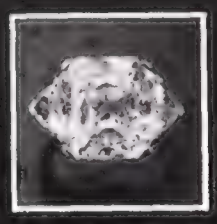

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Letters to the Editor

Hydropower

Dear Sir: I hope David E. Lilienthal's article in the September issue, "Lost megawatts flow over nation's myriad spillways," will be noted by policy makers and practitioners and that they will be stirred to take steps to recover some of the lost, nonpolluting energy potential described which exists in so many places in this country. In fact, this university city is the owner of a string of dams and lakes which were obtained some years ago when the Detroit Edison Company shut down its local generating plants on the Huron River. The system makes a nice string of parks, but the power potential is not being used.

Additionally, this article caused me to reflect again on what China is doing in this direction. I had the opportunity of visiting mainland China in 1974 as a hydraulic machinery specialist with a water resources group. I was impressed most by their policy of encouraging small hydropower installations. Of course, the necessity for China's action stems from different reasons, but we could well learn from them on this point.

James W. Daily
Professor of Fluid Mechanics and
Hydraulic Engineering
University of Michigan
Ann Arbor

Dear Sir: Author Lilienthal's argument for harnessing the wasted hydroelectric generating capacity of the nation's small dams is a compelling one. Part of its force lies in its recognition of our need to develop power sources suited to or available in a specific area of the country. By doing this, we might be able to apply various fuels and energy sources to uses each is best suited for in terms of economy, efficiency and environment.

Donald C. Fitzpatrick jr.
Bryn Athyn, Pennsylvania

Dear Sir: A report by the Department of Water Resources in California, published in 1974, pointed out that a "30 percent expansion of the present hydroelectric system output would yield more than 9 billion kilowatt-hours of energy per year, which is equivalent to the energy provided by burning 15 million barrels of oil per year in steam plants." More recently, state water agencies have found it feasible to construct small hydroelectric facilities such as those suggested by Mr. Lilienthal.

One major obstacle to construction of such power plants by public agencies is the Internal Revenue Service regulation that prohibits the granting of tax-exempt status for bonds used to construct any hydroelectric facility used to generate electricity in which 25 percent is sold or delivered to private producers.

It would make good sense to permit public agencies to construct the facilities to generate the power and sell the power to private agencies for distribution over their vast networks of power grids throughout the nation. Congressman John Joseph McFall from California has introduced legislation (H.R. 3757) that would make such bonds tax-exempt.

John P. Fraser
Executive Director and General Counsel
Association of California Water Agencies
Sacramento

Dear Sir: Alternatives to huge central station electric generating facilities, with their attendant severe ecological and public health impacts, certainly deserve greater emphasis than they are getting from energy planners. Retrofitting existing water impoundments with small hydroelectric power plants may be one way to accomplish the objective in an environmentally sound manner. However, one should not lightly assume—as the author has—that "where dams have already been built, there should be no impact whatsoever."

In the case of some small federal hydroelectric facilities, fluctuations have had very severe impacts—inundating waterfowl nesting sites, flooding crop-

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The bologna sandwich earned our lowest vote of confidence.

Consumer Reports explored this in detail in its impartial article on bologna, "How Good is the Bologna in that Sandwich?"

Here's how bologna stacked up against the other three sandwich foods... (1) Highest in cost-per-ounce of protein (2) Highest in fats and calories. The bologna sandwich, in fact, was over *four* times as expensive as the cheapest sandwich—peanut butter—at the prices prevailing when we made our test. What's more, bologna contains a potentially harmful additive called sodium nitrite.

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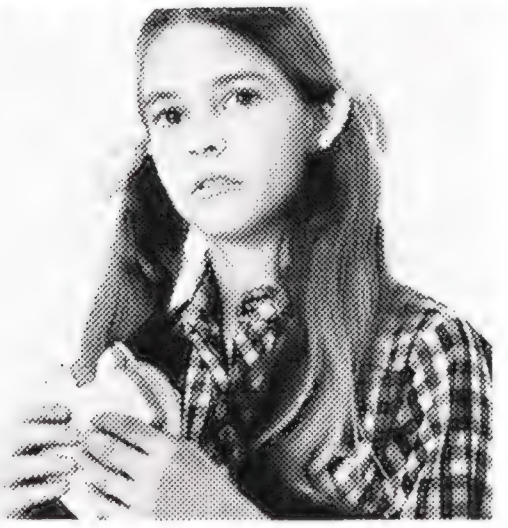

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2. Pizza Hut's 10" Supreme pie gave us the most nutritional buy out of eight fast-food meals we tested... Arthur Treacher's Fish 'n Chips the least.

3. Bounty may be a "quicker picker upper" than lower-priced paper towels. But you may be able to handle most of your clean-up jobs with the cheapest towel you can find.

4. Meanwhile, that much-squeezed-on-TV bathroom tissue that touts its softness whittled 150 sheets off each roll. (Once again, it's the customer who gets squeezed.)

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land, eroding stream channels and increasing downstream sediment loads.

One solution is to maintain a constant or near-constant release pattern, as determined by biological parameters. Unfortunately, hydro plants are used as "peaking" facilities, meaning they operate from zero to full capacity in short spaces of time to meet instant energy demands. The effect is like that of a Yo-Yo.
Patrick A. Parenteau
Counsel, National Wildlife Federation
Washington, D.C.

Dear Sir: At the Tom Sauk project here in Missouri, during periods of low usage of electricity, the surplus electricity is used to pump water to a reservoir at the top of a mountain; then during peak periods of electrical usage the water is allowed to flow back down the mountain, powering generators which produce more electricity. It seems our scientists should be able to devise ways, such as Tom Sauk, to store the electrical potential, if not the electricity itself.
William A. Crume
Ferguson, Missouri

Dear Sir: In the absence of compelling economic justification for hydroelectric use, ecologists might argue even more persuasively that the removal of unused dams would eliminate problems of eutrophication and curtailed fish migration by restoring rivers and streams to their free-flowing state.

The author observes that the nation's "natural habit and previous behavior" makes increased energy consumption inevitable. This conclusion is unsympathetic to the prospect that recent dramatic increases in the cost of energy and the nation's long-term potential to use energy more efficiently will lead to lower growth in energy consumption.
C. Richard Wilson
Malvern, Pennsylvania

Dear Sir: From a parched, water-rationed Californian, many thanks for the splendid photographs in your article on waterpower. I'd almost forgotten what large quantities of the stuff look like.
C.S. Churchman
Mountain View, California

Biosphere

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Robert Campbell, "The interaction of two great rivers helps sustain the Earth's vital biosphere," it makes you wonder how anyone can doubt the presence of a Supreme Being. It is quite possible that the "many mansions" referred to in the Bible are the billions of galaxies, each one being another mansion. It seems clear to me that it was the hand of God that led us to make the space flights, which ultimately opened our eyes to the harm that we are doing to the delicate balance of the Earth.
Laura N. Van Siclen
Queens Village, New York

Dear Sir: John XXIII stated that Man "was not a dwarf in the universe" and mankind's knowledge of the billions and billions and billions of suns and stars confirms the truth, in my opinion, of the revered Pope's statement. The billions of galaxies in the universe are certainly not, as part of the article seems to suggest, "a blow to Man's ego."
The Reverend Maurice Fitzgerald, C.S.P.
The Paulists at St. Paul's College
Washington, D.C.

On the trail of Tonto

Dear Sir: Much of the semiserious research Martha Kendall underwent to discover the origins of the Lone Ranger and Tonto could have been eliminated by reading that great master of Western fiction, Zane Grey. Certainly Francis Striker read such novels as *The Lone Star Ranger* (1915) and *Under the Tonto Rim* (1926).
George Reiger
Locustville, Virginia

Dear Sir: I've always assumed that *kemo sabe* was a corruption of *Quien no (se) sabe*, "He whom no one knows" or "He who is not known." One might also suggest that *tonto* normally means "foolish" or "silly" rather than the stronger "stupid" or "crazy."
Lincoln Bunce Spiess
St. Louis

Dear Sir: Many of us remember the radio series that first started in Detroit way back in January 1933. A record album, now available, of some of these broadcasts reveals that *kemo sabe* means "faithful friend," spoken by Tonto when he saved the Lone Ranger's life.

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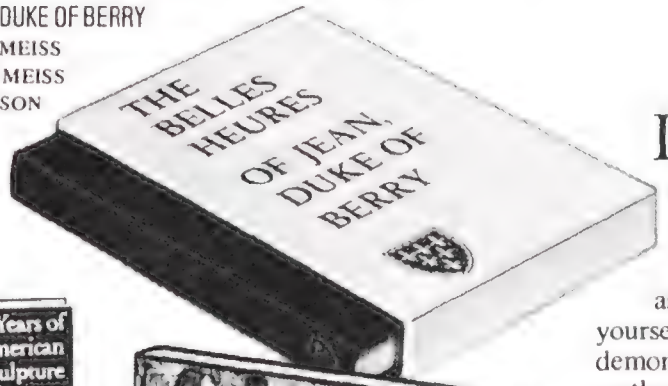

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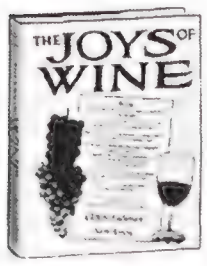

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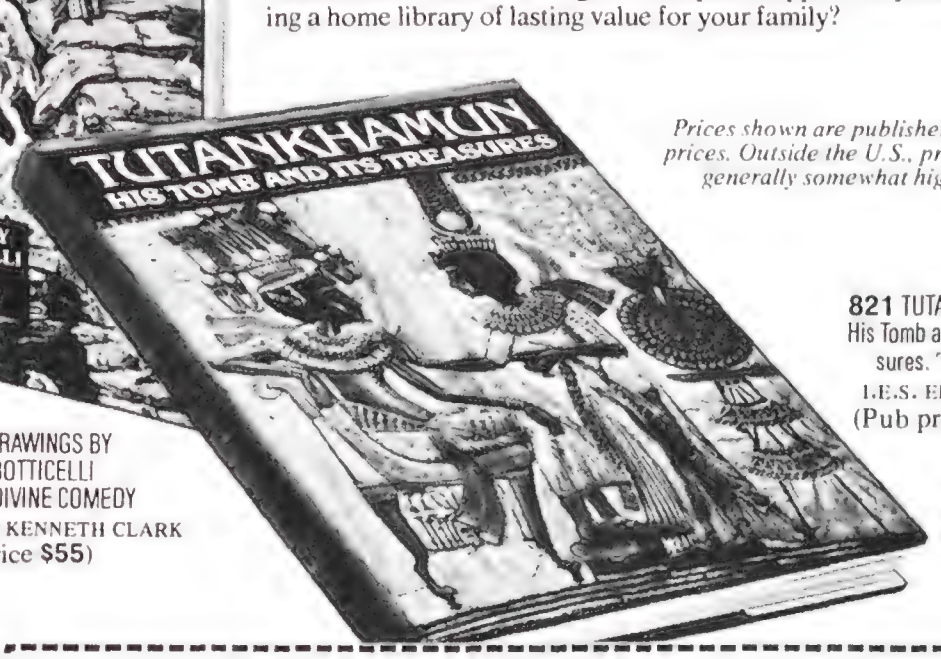

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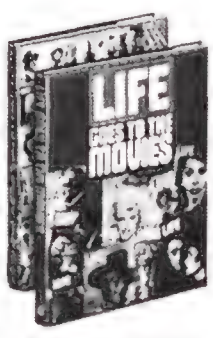

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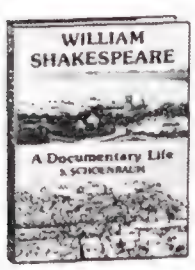

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Roger S. Wood
Lebanon, New Hampshire

Dear Sir: Another explanation of the origin of Tonto's famous phrase appears in the obituary of James Jewell (*Time*, August 18, 1975) who produced, wrote and directed many episodes of the early *Lone Ranger* radio series. According to this item, Kee-Mo-Sah-Bee, rhyming with Tonto's greeting, derived from the name of a boys' camp owned by Jewell's father-in-law.
Stephen L. Eberly
Dallastown, Pennsylvania
Camp Kee-Mo-Sah-Bee, at Mullet Lake, Michigan, was directed by Charles Yeager from 1924 to 1940. Ed.

Violin-making

Dear Sir: In the article, "Violin-making as American art," by Philip Kass and Michael Olmert, it was reported that a Stradivarius sold at auction for $80,000. I think that any one of the leading dealers in fine instruments played with a bow would confirm that there have been at least five or six instruments sold at prices in excess of $200,000. The article also stated that Ira J. White is "credited with being the first to wrap his sheep-gut strings with fine metal" and that today all strings are made that way. This is incorrect, as is the statement that there are 700 Stradivari violins extant.
Richard D. Colburn
Beverly Hills
Ira White was the first in the United States to sell commercially strings of sheep gut wrapped with wire. This method dates back to the late 17th century. As for the 700 Stradivari stringed instruments, this figure included violas and cellos as well as some 450 violins. Ed.

Dear Sir: We are told that the late Paulus Pilat once reportedly dunked his priceless Strad in his bathtub overnight, "the better to get inside to fix the cracks." You surely owe us more explanation.
Edgar Schenkman
Rochester, Vermont
According to coauthor Philip Kass, Pilat's repair techniques were cited by the violinist Louis Kievman in an article on Pilat in the Journal of the Violin Society. *But Kass has also been told recently by*

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violin repairmen that such a dunking could be disastrous. Ed.

Classroom at sea

Dear Sir: Matt Herron's "Sea and shores as classrooms" aroused many emotions as I read his account of the dream I have nurtured. After 20 years in the classroom, I am retiring and I still hope to get a sloop of my own. As a teacher this was denied and now my children have gone.

Matt Herron took too many cheap shots at the educational institutions for me to be completely happy with him. Basically, parents dictate conditions.

Herron did a good job of chronicling his trip and, perhaps without analyzing it, pinpointed the most important aspect of education—parent involvement. If he had not taken this trip, his children would have continued to watch too much TV, read too little and be smothered in the American school system.

The Herrons may inspire other parents to spend more time with their children.
Gordon King
Panama City, Florida

"Get rid of the people . . ."

Dear Sir: The art illustrating Patrick Ryan's "Get rid of the people, and the system runs fine," has mixed up its right and its left side. People queue up at the right side of the road as they face an oncoming bus since, as your artist should have realized, English traffic moves on the left side of the road. These hapless people only get a wave of the hand from the bus driver.

Your face—like the bus—should be red.
Kenneth Weitzenhoffer
Brooklyn

Dear Sir: Patrick Ryan's article made me think of my father, in a small café in England during the 1940s, ordering a dish of berries without cream. The waitress responded, "Sir, the dish is berries *with* cream." My dad politely asked that she refrain from pouring the cream on the berries. The waitress, after consultation, announced firmly, "Sir, cook says the dish is berries *with* cream and if we start giving everyone what they want, where will it all end?" My dad enjoyed his berries *with* cream.
Nancy Gillan
Ketchum, Idaho

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Phenomena, comment and notes

The misty origins of Man and his best friend, benefits of arboreal suicide and new faith in Yankee inventiveness

By now train buffs are certainly resigned to being antiquarians: it seems that barely a week passes that Amtrak doesn't curtail service in one place or another in the Republic. One can, without any effort at all, foresee the day when Congress, realizing the cultural significance of the train in the nation's past, votes to turn Amtrak over to the Department of Interior to administer the last remaining rail lines as historic monuments.

But there is cause for optimism. One reads in a British journal, *New Scientist* (Vol. 75, No. 1063), that American engineers at Lawrence Berkeley Laboratories in California are working on a new transportation scheme. They have been deeply concerned about the inefficiency of electric cars and believe the power for cars should not come from the car, but from the road. They plan to build a "conventional vehicle powered by a traction motor" which would derive its energy from a conductor built under the highway, the conductor being tied into the local electricity network. The vehicle would also have a secondary power source of batteries that would allow it to travel on unpowered highways and side roads.

A problem they recognize is how to keep the car driving steadily above the conductor rather than drifting back and forth in the lane, losing juice. It occurs to me that they will soon find themselves proposing some kind of grooves into which the car's wheels will fit. Then it will be deduced, after vast expenditure of money, that metal wheels on metal grooves will reduce friction. Then social psychologists will perceive that people in these cars would rather play pinochle than keep track of the car. Coupling devices will be added to the front and back of each car, requiring only one alert driver for an entire string of cars. And thus, in the way of American genius, just as the last non-Park-Service-operated railroad right-of-way is being sold to the resort developers, we will—in the nick of time—have reinvented the train.

Early dogs

Some people think of dogs as a public-health hazard, a source of noise and other pollution and a totally uncalled-for drain on the planet's limited protein resources. They may be right, but getting any action taken consonant with these indictments is about as likely as finding a live *Ramapithecus* and asking him whatever motivated him to start out on the path to humanness. The association between human and dog is a long and atavistic one, not to be trifled with by the righteous.

The earliest domesticated dog was until recently thought to come from North America; known as the Jaguar Cave Dog, it lived in about 8400 B.C. Recently, the Palegawra dog turned up in Iraq, dated at 12,000 years ago.

Yet other ancient dogs have been spotted near Lake Baikal, dating back to 9,000 years ago, and maybe in Siberia in a site dated at more than 20,000 years ago. It's hard to be certain, say Stanley J. and John W. Olsen in *Science* (Vol. 197, No. 4303), because in many cases the remains have now vanished and we have only previous scholars' words for it. The Chinese finds, which are apparently rich, had been largely overlooked simply because

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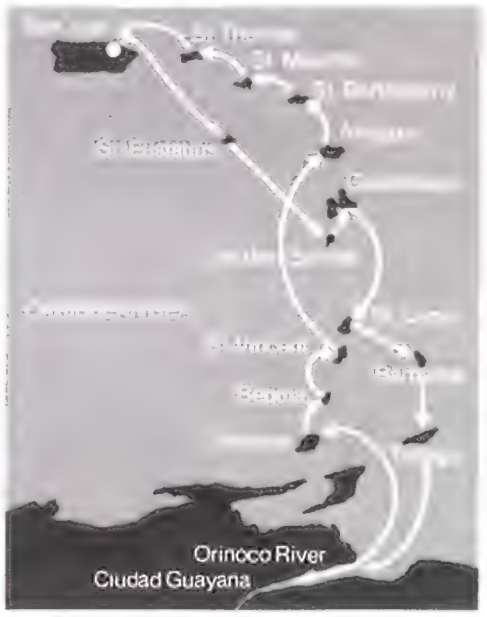

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they are described in Chinese. The Olsens have translated the Chinese into English and have their own candidate for the first tame dog.

They suggest domesticated dogs almost certainly came from wolves, which exhibit the social behavior that would prove them better suited for domestication than the less socially minded jackals and coyotes. (You can tell a domesticated dog from a wild wolf, they say, because, for reasons obscure, dogs have shorter snouts.)

And while it's possible dogs were domesticated independently in several places at several times, the Olsens' candidate for the source of Man's best friend is the Chinese wolf. This is smaller than our wolf, and early domesticated dogs were all small. More, the Chinese wolf shares with domesticated dogs, but no other wild canid, an overhanging bone process on the jawbone which may have something to do with the transition from being strictly carnivorous to becoming an omnivorous carnivore.

Of course, as is usual in these matters, all this awaits further research.

Turkish genesis?

For some reason one's origins hold a special fascination, so that every time that apelike hominoid creature known as *Ramapithecus,* deeply implicated in launching the human line out of the 15-million-year-old mists of the Miocene, is mentioned in a scientific journal, the heart beats a little faster and the eyes seek answers among the Latinate terms of anatomy and stratigraphy. The search is not always completely rewarding, in this case taking place in the pages of *Nature* (Vol. 268, No. 5622), a magazine not written for laymen so one cannot complain. One is immediately lost in a Tolkienesque geography. It says, "the Pasalar sequence represents an equivalent of the Middle Miocene Turgut member. More specifically its mammalian fauna can be correlated with the fauna from Prebreza [Yugoslavia]" and is earlier than the fauna of Bjelometscheskaya (Northern Caucasia) and Sansan (France). Pasalar, one learns, according to the traditional European time scale, corresponds also with the early Vindobonian, slightly older than the Sansan. Pasalar, by the way, is a place in western Turkey where, during paleontological fieldwork in 1969, deposits very rich in Middle Miocene fos-

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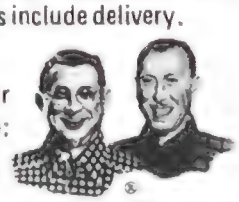

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sils were discovered, report a British scientist and a German scientist. Examination of 100 isolated primate teeth, which were part of the find, leads them to the conclusion that an African forebear gave rise to two humanlike, closely related creatures, *Ramapithecus* and *Sivapithecus,* which began to diverge in Eurasia into more widely separated, less primitive forms, the former leading ultimately to us. So our African genesis is again in doubt, depending on how far back in time you go and on who you think really started it all —which unfortunately leaves us where we started in the first place.

When suicide is good

When American engineers built the Panama Canal they created a large body of water called Gatun Lake and, in the middle of that, an island called Barro Colorado. The island soon became the focus of some classic biological research and then fell into the hands of the Smithsonian Institution, which formally established there its Tropical Research Institute and has continued the tradition of patient basic research in tropical ecosystems (SMITHSONIAN, August 1975).

It is pleasant to learn that while the Canal is now raising some remarkable political hackles, the work of the curious naturalist goes on in its watery middle with the same deliberate regularity as the processes of nature.

Not long ago, a visiting scientist at STRI, Robin B. Foster of the University of Chicago, wondered about some tropical trees that, more or less synchronously, would flower and within a year drop their leaves, release their fruit and die. A case of suicide, he thought. How could that serve the evolutionary aim of the tree to survive? After spending a lot of time with a number of these trees, called *Tachigalia versicolor,* Dr. Foster concluded that the tree's suicide is an act of generosity, as it were, to its progeny. After flowering, the seeds drift down below the tree in the shade of the surrounding trees. In dying, the old parent provides sun and space for the young to flourish by creating openings or light gaps in the thick forest canopy.

Another brick in the structure of understanding the tropics and perhaps an unintended presentiment for the overpopulated world of the future.

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Alexander Leaf, M.D.:

ON THE PHYSICAL FITNESS OF MEN WHO LIVE TO A GREAT AGE

PUBLISHER'S NOTE: *Alexander Leaf, M.D., Jackson Professor of Clinical Medicine, Harvard Medical School and Chief of Medical Services, Massachusetts General Hospital has traveled the world to examine people who are living to a great age in vigorous health, free from the infirmities and debility which plague so many of our elderly. What he has learned can help you if you want to enjoy living a long, long time in sturdy health.*

—Richard Stanton

In the Caucasian village of Duripshi I found myself running, jumping and slithering down the rocks to keep abreast of Markhti Tarkhil, age 104, as he descended to the cold mountain stream where he had his daily bath. Markhti had related that as long as he could remember he bathed each morning in this fresh stream. We got into our car at Markhti's house to drive down to the stream where we would take pictures. Halfway down the rough road the driver stopped and refused to go further. "If I proceed further down this road I'll never get the car back," he claimed. While we were arguing Markhti jumped from the car and asked, "What are we waiting for?" Whereupon he started down the hill with me in pursuit. It proved to be a difficult and rough descent, but Markhti moved so quickly and agilely over the rocks and down the river bank that I had difficulty keeping beside him, frightened at what might happen were he to stumble and fall. Knowing how fragile the bones of most of our old people are, I had terrifying visions of picking up the pieces were Markhti to trip. Fortunately, no such mishap occurred and Markhti reached the bottom of the hill ahead of me.

Later I asked the Russian doctors there how often the old people suffered fractures. They shrugged and claimed there rarely were fractures. The constant physical activity of these vigorous elders keeps the balance between bone formation and destruction such that the bones remain mineralized, dense and strong.

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By Dora Jane Hamblin

Maladies of Venice: decay, delay and that old sinking feeling

The city is not necessarily doomed, but those who seek to save her will have to do better than in the past. It may happen

Reports of her death have been exaggerated, but there is no doubt that regal Venice, the dowager empress of the Adriatic, is desperately ill.

Her lovers, and the merely curious, call upon her assiduously: five million or so a year. They admire the Titians and Tintorettos, misquote Shakespeare at the Rialto Bridge, feed the messy pigeons in front of that ultimate Byzantine monument, St. Mark's Basilica. Most go home happy, all unaware that Venice still has no viable sewer system, that almost 58 percent of the dwellings have no central heat, that more than one-third of the population has fled across the famous lagoon in less than 25 years to the relative comfort of dry apartments on the mainland.

Yet even the most art-drenched tourist must see the deterioration. Blocks of weathered Istrian stone slip periodically from their moorings beside the stations of the *vaporetti,* or water buses, and subside into the canals. Church facades crack down the middle. Eroded marble reliefs lack noses and fingers, and pigeons nest quietly behind the ears of sculptured saints. Plaster falls from exterior walls of once-glorious palaces on the Grand Canal, exposing the damp brick beneath. First floors, too wet for habitation, are closed off and their windows boarded up.

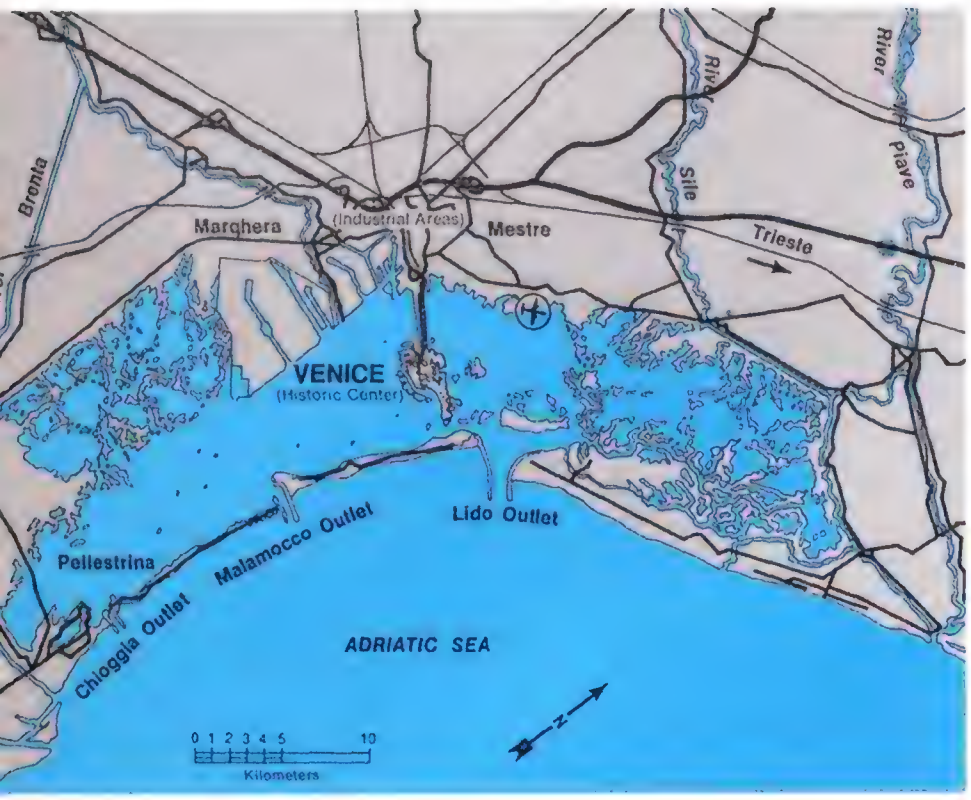
Winter's cold and damp settle on Grand Canal, veiling church of Santa Maria della Salute in fog.

All this despite the fact that, for more than a decade, millions of dollars have been borrowed, begged, donated or appropriated to save the city. The big trouble is that the dowager's doctors have been paralyzed by the complexity of the illness. A strangling bureaucracy at all levels (the national government, the regional government, the city administration), convoluted politics and stridently competing aims and claims have induced Italian administrators to behave like lifeguards arguing over who should throw out the cork ring—and who will have to pay for it if it doesn't work. Meanwhile, would-be rescuers from UNESCO, the United States, half of Europe, even Japan, Iran and Brazil, not to mention thousands of concerned Italian citizens, are constrained to dance around the perimeter alternately urging haste and crying "shame" at too-hastily conceived cures.

The shocking state of Venice might have remained only a local sorrow had it not been for the big flood of 1966. Eleven years ago this month, heavy storms spread havoc across much of northern Italy, drove the Arno River out of its banks to devastate Florence, and sent more than six feet of high water rampaging through the homes, shops and piazzas of Venice.

At first, both Italian and world attention focused on Florence, but within weeks a cry for aid came from the lagoon city. Led by UNESCO, dozens of private organizations rushed to help: from the United States the Committee to Rescue Italian Art (CRIA) and Colonel James A. Gray's International Fund for Monuments (IFM); Great Britain's Venice in Peril Fund and Italian Art and Archives Rescue Unit; hastily formed committees in West Germany, France, Yugoslavia, Australia and other countries; plus a host of Italian public and private institutions. In the years since the flood, this cadre of international volunteers has done wonders and spent from 3.5 to 4 million dol-

Color photographs by Dmitri Kessel



Map shows Venice, industrial areas (Marghera, Mestre) and three channels linking lagoon with Adriatic.

lars in the process. This year, 33 groups from 13 nations are funneling funds and experts into the rescue. The Italian financial contribution (from ten distinct groups) ranks second only to that of the United States.

Thousands of square yards of frescoes and paintings have been restored. Churches have been renovated and structurally repaired, palaces put in order, bridges and facades cleaned. All this is wonderful, but it is in a sense only cosmetic. What good to save the treasures, if the whole city is doomed to wash away or perish in its own pollution, erosion and neglect?

The basic cure for Venice is a job only Italians can do, and it has become a classic case of the collision of warring interests: ecologists versus industrialists, city planners versus regional planners, developers versus preservationists. It is, to be fair, a staggering problem; "Everything that must be done in Venice must be done at the same time," complains the hard-working Communist assistant mayor, Gianni Pellicani.

Venice has been in peril, no doubt, since the first settlers sank wooden piles into the ooze of the lagoon in the fifth century A.D. and decided, against all odds, to build a city there. They had astonishing luck for centuries, grew rich and powerful, famous and decadent. Venice was the longest-lived republic the world had ever known, until it fell in 1797 to Napoleon, who then handed it over to Austria. In 1866 it was incorporated into the brand-new Italian unified state, and lurched uncertainly into the more complex perils of the 20th century.

In the middle of World War I the renowned Venetian Arsenal, which since the 12th century had mass-produced men-of-war and armaments, closed down and turned 8,000 men out of work. A group of local patriots, led by Count Giuseppe Volpi and including members of the Cini and Gaggia families, rushed to the rescue with a plan: Venice could once again become an important port, an industrial center, if it would build modern facilities. The men placed their dream on the mainland, on the other side of the causeway which Austria had built in 1846 to connect the island city for the first time with terra firma.

The new industrial zone, called Porto Marghera, was created by filling in about 500 hectares (1,235 acres) of mud flats. It thrived and attracted the beneficent attention of Mussolini. As Marghera grew, an adjoining tiny community called Mestre became its bedroom. By 1927 these satellite areas had grown important enough to be incorporated into "Greater Venice," which included the historic center and the islands of the lagoon.

Venice survived World War II relatively unscathed, though Marghera was bombed, and shortly after the war a second industrial zone grew up nearby. This one took another 500 hectares of what Venetians call the *barene*, or mud flats, and gobbled up twice that amount of adjacent farmland. Petrochemical, aluminum and other heavy industries, shipyards and oil refineries went up. The three ancient channels of Chioggia, Malamocco and Lido, which link the lagoon with the Adriatic Sea, were deepened to facilitate

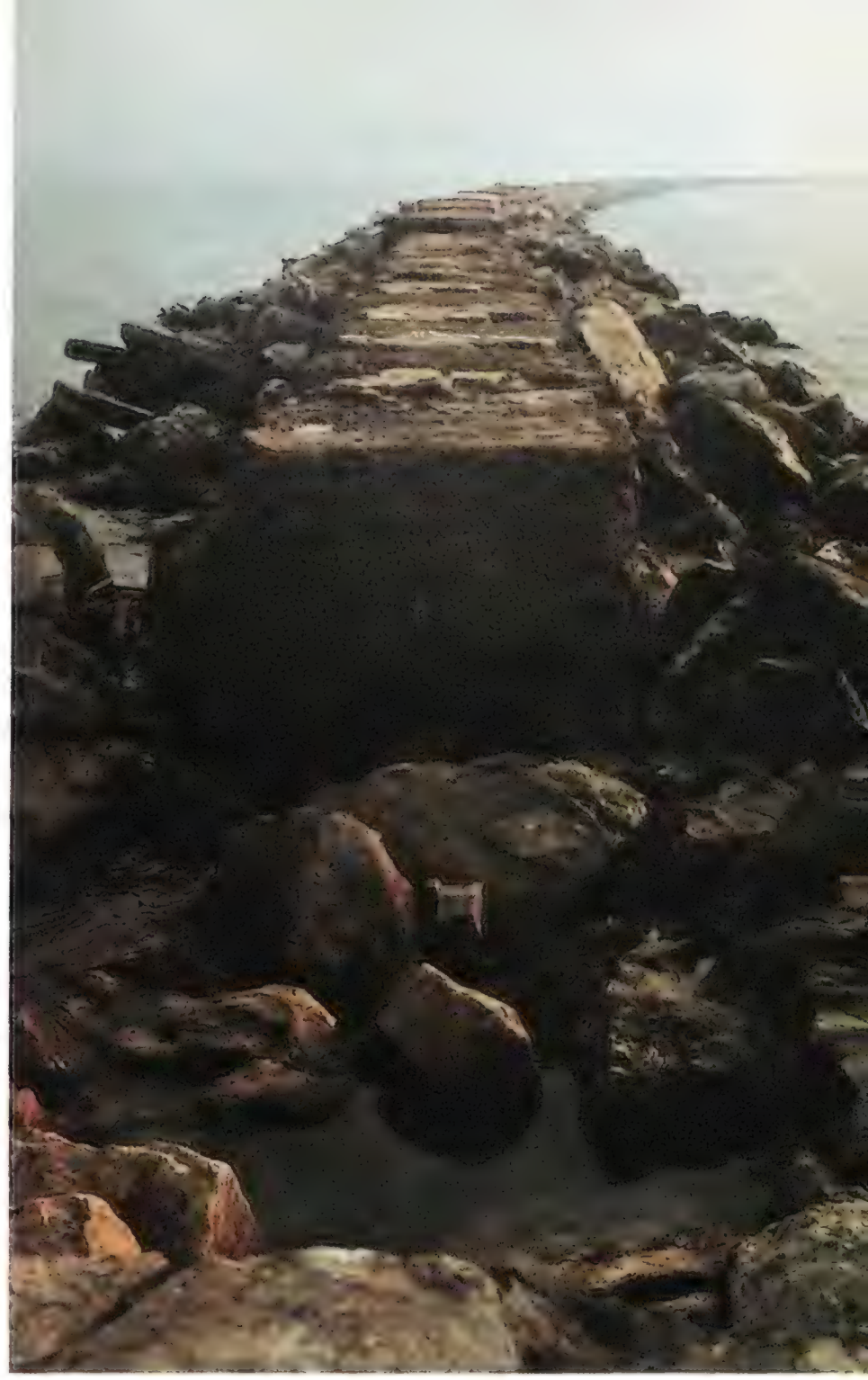
The Piazzetta di San Marco was submerged by highest waters in recorded history: the floods of 1966.

Dora Jane Hamblin, who lives in Italy and writes frequently for SMITHSONIAN, *is a former* Life *bureau chief and the author of* That Was the LIFE.

access to the factory areas. Tourists suddenly were treated to the sight of 60,000-ton tankers cruising through the Giudecca Canal less than a hundred yards from the Doge's Palace.

For a while in the 1950s it seemed that happy days were here again. Employment on the mainland rose steadily; a third and even more gigantic industrial zone was projected. Yet in the rush of postwar building, some of it illegal and some just ineptly designed, the face of Venice began to change. The clashingly modern railway station in the center and a towering, ugly parking garage across from it were joined by several architecturally unsuitable hotels and innumerable "elevations," *i.e.*, extra floors perched atop older existing buildings. Rich foreigners rushed to acquire palaces or a piece of a palace, as did rich Italians for whom "a second home in Venice" seemed desirable.

There were a few danger signals. Some days the sun was obscured by pollutants either from within the city or from across the lagoon. Fish began to vanish from the canals. Pieces of stone—small, at first—began to fall from buildings. Most ominous of all was the increasing incidence of *acque alte*, or high waters. Venice has always been subject to exceptionally high tides, caused by meteorological events such as low-pressure systems or scirocco winds from the southeast which fill the Adriatic gulf to overflowing. These are dramatic but less dangerous in the long run than smaller, but more frequent, inundations. *Acque alte* are described specifically as tides of 1.1 meters, or about 43 inches higher than a so-called "normal" tide reference-level established in 1897. In the 20th century their occurrence increased, and waters of three and a half feet or higher have come with monotonous regu-



Ancient breakwater that protects Venice from sea has been neglected, was badly battered in 1966.

Experimental model of inflatable dam proposed by Pirelli/Furlanis to seal off channels in high tides.

A forlorn relic, this gondola was thrown up on the pavement by one of Venice's periodic storms.

Seen from Venice, the industrial zone of Marghera darkens the evening sky with smoke and fumes.

Motorboats and steam launches congest the Grand Canal, making waves that weaken foundations.

larity. Even more alarming was the increasing difference between high and low water. The highs were higher and the lows were lower.

Although not immediately apparent to tourists, these fluctuations create near-intolerable problems for Venetians. In high water the boats have trouble getting beneath small bridges, and in low water even emergency craft—fire and ambulance boats—cannot navigate the smaller canals. Furthermore, the exaggerated changes between high and low cause structural damage. Stone, wood, even brick, will survive for a long time if they are either totally wet or totally dry. But the alternation of wet-and-dry, dry-and-wet, sharply increases the disintegration of the basic fabric.

Complicating the phenomenon was the now-celebrated "subsidence" of the city. Greater Venice was plagued by the existence of about 20,000 deep artesian wells dug to suck up water for public use and for the needs of the increasingly greedy industries on the mainland. As this sustaining underground water table fell, so did the lagoon bed above it.

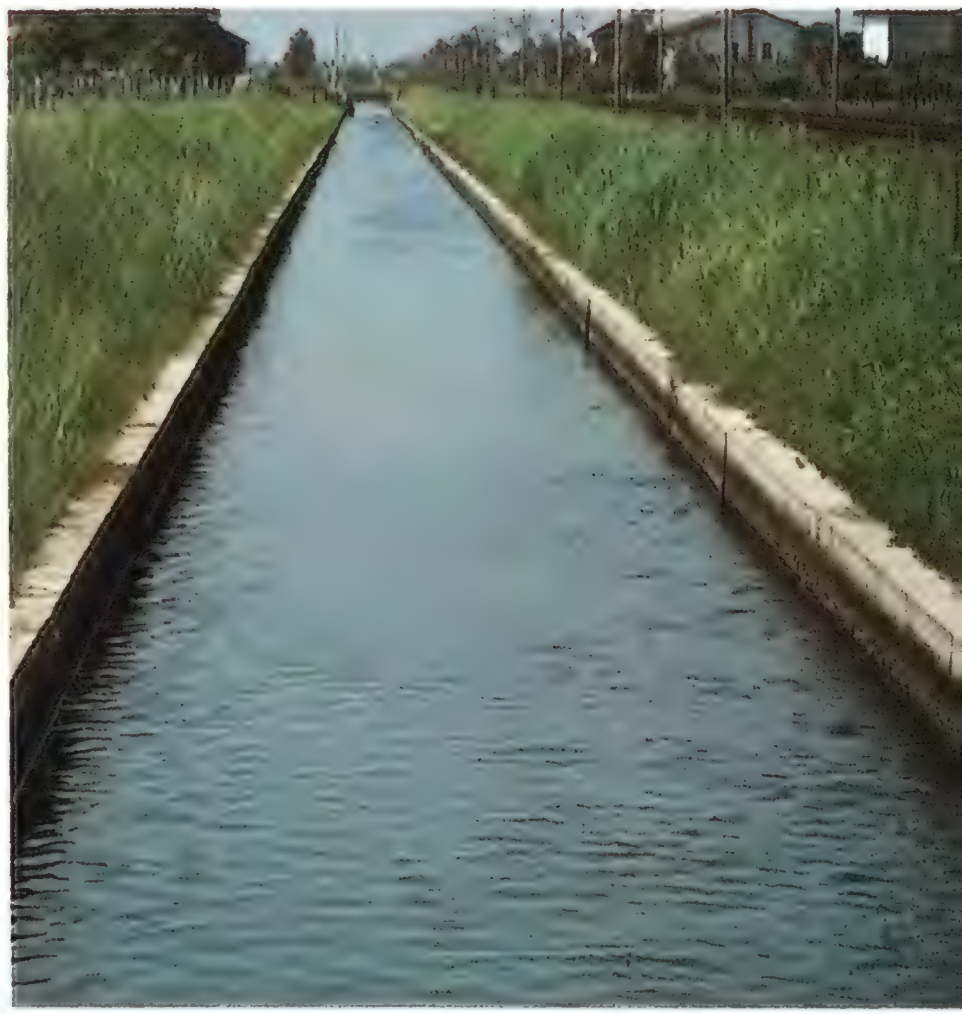
Oceanographers, marine biologists, even ordinary Venice-lovers with boats knew what was wrong: Man had tampered too long and too drastically with the delicate balance of the lagoon and its underpinnings. When the Venetian Republic was at its height, the

Its refineries and other industries provide jobs for Venetians, but are a source of pollution.

most powerful citizen in it, after the Doge himself, was the Superintendent of the Waters. His authority was awesome: he could forbid fishermen to dam the lagoon to make hatcheries; he could keep people from building on or filling up the vast mud flats into which the incoming tides rushed twice a day, and from which they retreated, slowly, when high tide was over; he oversaw the cleaning and dredging of the 160-plus large and small canals of the city.

The happy Venetians of that era had no need for man-made sewers because the unimpeded tides came rushing, sucking, evacuating, twice a day. They tended their seawalls carefully, and were so jealous of their limpid waters that they forbade housewives and their slaveys even to beat rugs on balconies, for fear dust would fall into the canals where gondolas plied.

Beginning in the 19th century, after the Austrian occupation, it all changed. For whatever reason, Venice began neglecting its seawalls, left its small canals undredged. Then the industrial zones filled in 2,500 acres of mud flats, the escape valve of other days, and a projected third zone was planned to take away far more. Other acres were filled in to let the town of Mestre grow and to build the airport. By one expert evaluation, an incredible one-fourth of the total area of the lagoon has now been closed to the tides. At the



Artesian wells, which have lowered the water table, will be replaced by aqueducts such as this.

same time, all the channels have been deepened, and a new tanker canal dredged from the Porto di Malamocco to the industrial zone is 40 feet deep. Water rushing through such deep channels has an erosive effect on everything from seawalls to basements, and with the escape hatch of the *barene* so restricted, it has trouble getting out before the next high tide.

When the flood came in 1966, many conservationists and ecologists, both Italian and foreign, were secretly relieved. Now, they thought, at last Rome and the rest of the world would pay attention. The late René Maheu, director-general of UNESCO in Paris, instantly offered his own services, and the concern of the organization, to the stricken city. Within months that body had set up an office in Rome to coordinate international aid to both Florence and Venice. The mere existence of the office, plus some exuberant journalism, convinced most Italians and a great part of the Western world that UNESCO was at the ready with "an international loan" of millions, just as it rushed to the rescue of Egyptian treasures when the Aswan Dam was built.

UNESCO officials today deny that there ever was such a loan, or even the offer of one. The organization did help raise money to enable Venice's Superintendent of Galleries and Monuments to catalog and restore the most gravely endangered major works of art. Money came to help set up a restoration laboratory in the monastery of San Gregorio, and to support an international advisory committee to direct the salvation work. Maheu devoted a great part of the last ten years of his life to lobbying and working for an effective campaign to save the city.

Five years after the flood, the Italian Senate finally passed a special statute to safeguard Venice. That was in December 1971, but the statute had not yet passed the lower house when the government fell and the

Decaying housing, such as this in the Ghetto Nuovo (New Ghetto), is another severe problem.

Venice law was lost among 3,773 others under consideration at the time. Not until April 1973, almost seven years after the flood, did a national law finally pass both houses. It was a painfully obvious compromise between the interests of industry and the preservation of the historic center. It postponed development of the "third zone," but it approved completion of the hotly opposed (by ecologists and hydrologists) deep tanker canal. It threw a bone to labor by guaranteeing that the 40,000 to 50,000 jobs in the Marghera-Mestre area would be maintained. It directed that sewers be built, polluters controlled, artesian wells capped and replaced by aqueducts, home heating switched from oil-based fuels to nonpolluting methane gas or electricity.

The law was specific about expenditures. Half a billion dollars would be raised and divided roughly into thirds: one-third for the national government, to repair seawalls and bridges, to combat damage done by high water and to construct barriers in the channels as a defense against high tides; one-third to the regional government, charged with devising antipollution measures and building aqueducts and a

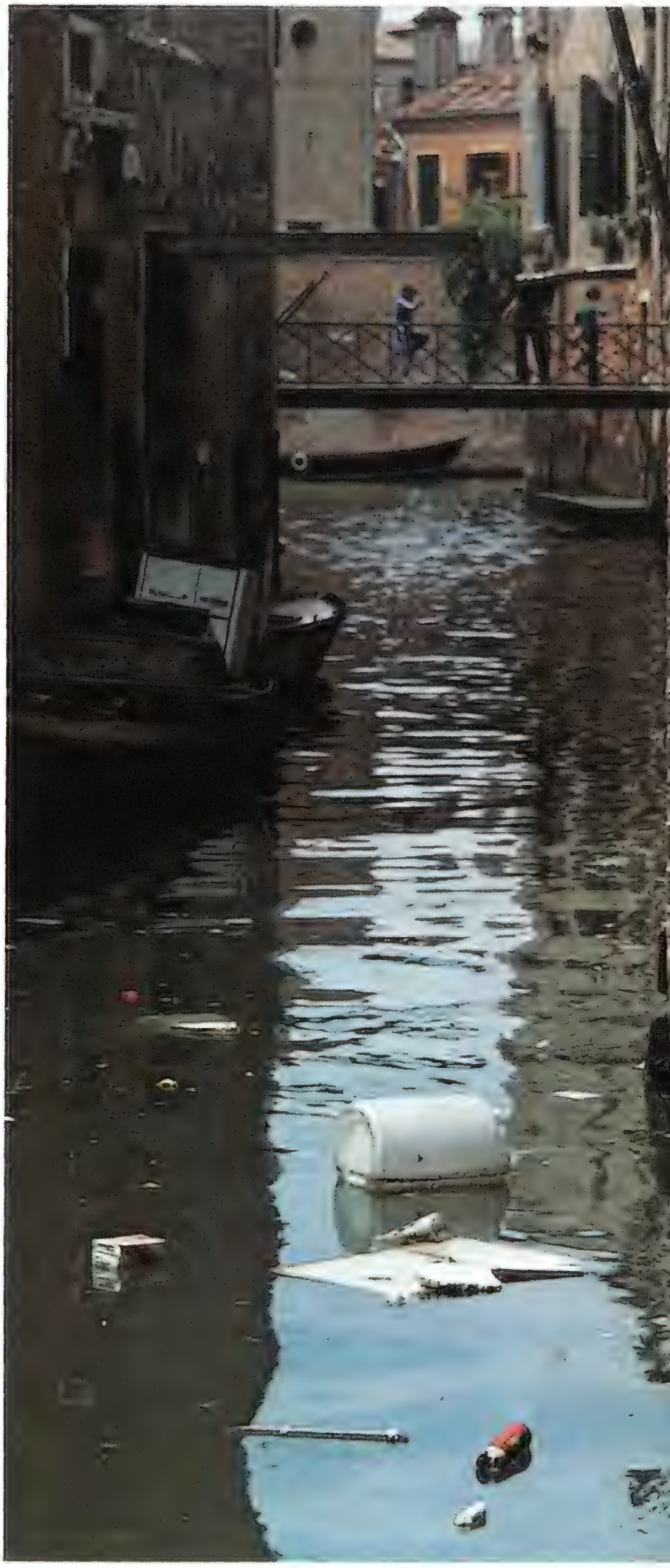
Thousands of workers have moved to better quarters on the mainland, commute back to jobs in Venice.

sewage-treatment system; one-third to the city of Venice for restoration of decayed housing, palaces, bridges and monuments in the historic center and on the islands of the lagoon.

The latter job turned out to be far more complex than it seemed because of the shift in population from "old Venice" to the mainland. In 1945 the historic center boasted 180,000 residents and the mainland 83,000. But today the balance has shifted, aided by the departure of well over 80,000 Venetians to the mainland, so that almost two out of three citizens of Greater Venice live within the industrialized zones.

Six months after passage of the law, Italy issued a loan contract described as a "prefinancing loan . . . in connection with the preservation project of the city of Venice." Banks all over the world rushed to take up the issue, at favorable terms to Italy, and very quickly one of the biggest loans ever arranged on the Eurodollar market was accomplished.

Then, to the consternation of many, the money didn't go to Venice. For one reason: no official governmental body, on any level, was ready with precise plans for how to spend it. No serious organization



Slums, not palaces, are reflected in the refuse-filled waters of a canal well away from the tourist beat.

Moved inside for study, decapitated horse is one of four above portal of St. Mark's. Whether Greek or Roman, they were taken to Constantinople, later carried off to Venice at the end of Fourth Crusade.

Ghostly under plastic, angels from St. Mark's facade have been relegated to roof for restoration.

will leave such sums lying about, so the Eurodollar loan—it was generally suspected—was used to help prop up the staggering *lira*.

At the risk of boring everybody, it must be explained that passage of a special law in Italy commits the state, but also indicates primarily *intent*. To implement the Special Law on Venice required supplementary issuance of guidelines called *indirizzi*. A government led by Mariano Rumor had some *indirizzi* ready in October 1974, but the government fell four days before the crucial vote. Twenty-three months had dragged by between passage of the Special Law and the final appearance of *indirizzi* in the spring of 1975, endless months during which endless committees had endless meetings.

After the *indirizzi* must come detailed plans and projects for each particular segment of the total problem. And at every turn the warring elements, both political and economic (leaving out for the moment the artistic and historical), collide.

Item: Industrialists insist that Venice needs more and more jobs on the mainland.

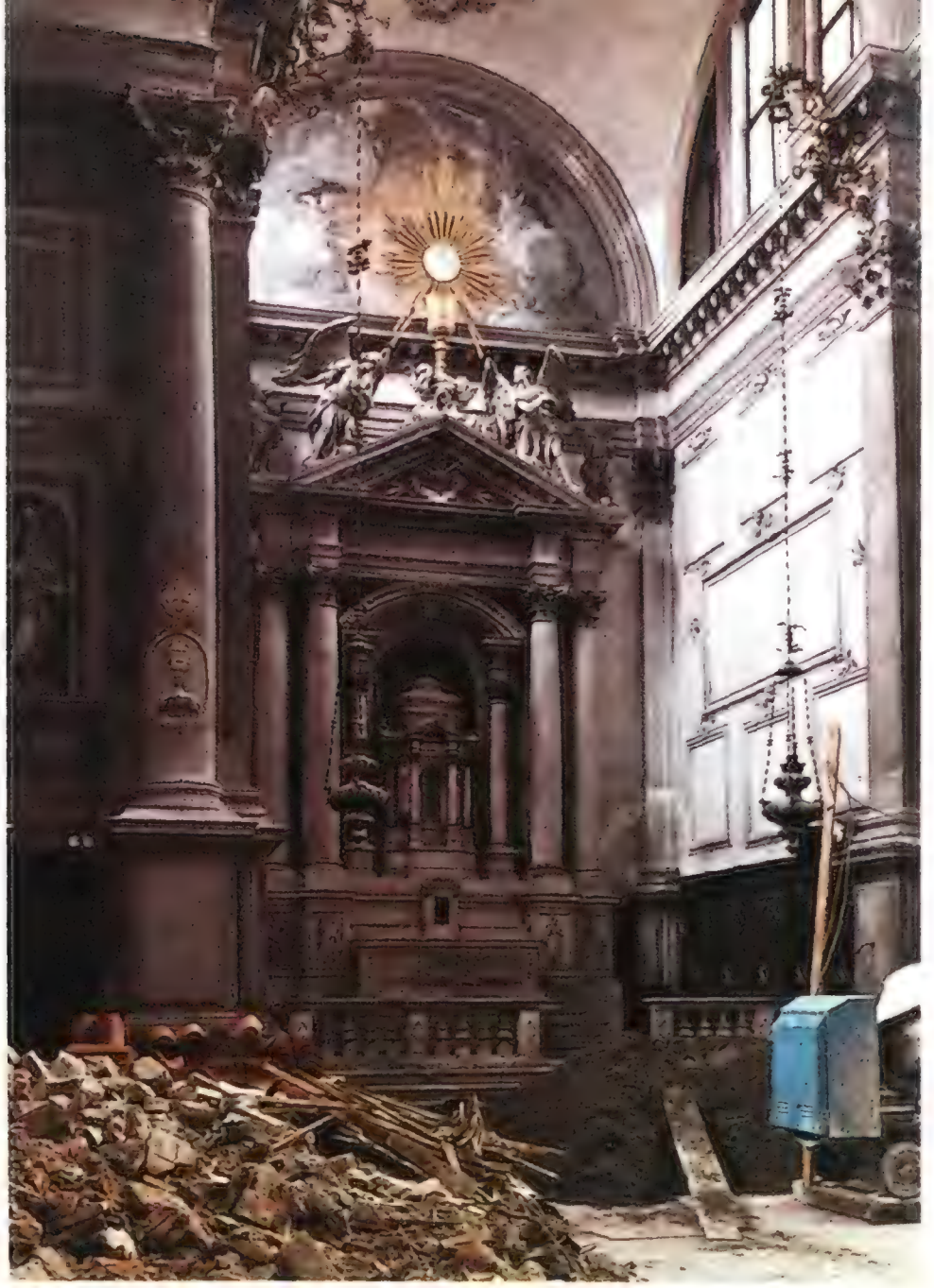
Supporters of the historic center counter that most of the present industrial workers come from surrounding mainland areas rather than from Venice itself, and statistics confirm their view: every day about 24,000 residents of Mestre and its surroundings commute back to the historic center to work, while only 1,700 go the other way to mainland jobs.

Item: What to do about deteriorating housing in the center, substandard conditions which forced Venetians to go to the mainland in the first place?

Everyone agrees that the commuting workers should be brought home again and the exodus halted. But no one agrees on how to do it.

The ruling Communist-Socialist city administration is determined to renovate housing for workers

Three horses of the Quadriga, as they are called, are in place. Missing is one on opposite page.



Interior of the late Baroque church of San Stae, on Grand Canal, is being restored with Swiss funds.

and prevent speculators from buying up and restoring property which then might become too expensive for the working class. To this end they have set up rigid rules which make it almost impossible for even an owner to fix up his own property. The result has been a private paralysis which compounds the official one, and an explosion of illegal alterations on the part of those rich or influential enough to risk a fine.

Item: Control of high water. In the wake of the flood, in 1969, the Italian government set up a laboratory with the high-flown title of Institute for the Study of the Dynamics of Large Masses. Its chief was a U.S.-trained oceanographer, Roberto Frassetto, who for six years labored mightily with the help of nearly 200 scientific and technical volunteers from all over the world, an IBM computer, and an offshore research platform from which they made field measurements of water levels, currents, waves and tides.

The Institute tested and evaluated a dozen systems for preventing *acque alte,* everything from placing maneuverable barriers in the Adriatic channels to actually raising the land mass. The latter involved a technique called mud jacking, in which a resilient substance is pumped deep into the subsoil to support and raise land levels and the buildings on their backs.

Much more public attention has been devoted to the series of proposals to close the three seaward channels in case of high tide by man-made barriers. One, developed by the Pirelli/Furlanis Consortium, would anchor giant hot-water-bottlelike structures to the bottom and inflate them when necessary (p. 43). Another would install pivotal metal discs which would be raised or lowered. An international tender was extended for proposals, and by the end of 1976 six firms had submitted plans which are currently under study.

Many oceanologists, hydrologists and Venetian citizens hope the decision will never be made. Further tampering with the natural passages, they argue, would only increase the erosive action of incoming tides; besides, it would impede the outrush of the tides, upset the flushing action and set up stagnation which would become a breeder of disease.

What should be done, ecologists say, is clear and simple: restore the old channels to their previously much shallower depths, abolish the tanker canal and serve the industries with overland oil pipelines, liberate the thousands of acres of *barene* now enclosed for fish hatcheries or the proposed development of the "third zone" (now temporarily halted), dredge the silt-and-garbage-filled secondary canals. Also, restrict the size, speed and traffic patterns of the public and private motorboats which churn through the main thoroughfares, throwing up lashings of waves and the pollution of their motors.

Item: Pollution of air and water. Conservationists blame the industrial zones, industrialists blame Venice itself. Some restorers agree with the industrialists. Even so august a witness as Sir Ashley Clarke, former British ambassador to Italy and now a vice chairman

The Arsenal, restored with Italian private funds, built the fleets with which Venice ruled the seas.

International Fund for Monuments has made possible restoration of the church of San Pietro di Castello.

of Britain's Venice in Peril Fund, holds that "Prevailing winds carry industrial pollution inland, not across the lagoon to the historic center."

Yet on any day when the wind blows from the wrong direction, or when there is no wind at all, towering columns of yellow and red and black effluent from the mainland are visible in the historic center, and spread over the city "like an airborne mattress," in the words of a stern *Italia Nostra* conservationist.

Air pollution levels, now measured and infrequently reported by city authorities, instead of by the ecologists who set up the system, seldom reach the danger point for long periods of time. But, say conservationists, if the official level (a very permissive .30 parts of sulfur dioxide for every million volumes of air) is exceeded for only one half hour every week, it attacks the stone, marble, brick and bronze of which Venice is made.

Lagoon Venetians have done their part. In response to provisions of the Special Law, they dutifully converted home heating from oil-based to methane fuels. They were supposed to get 40 percent of the cost back from the state, and about one-third of them have been reimbursed, but the other two-thirds are still waiting.

On the mainland, however, the local health officer in 1973 ordered workers in Porto Marghera to wear gas masks to protect them from clouds of nitrogen oxide, sulfur dioxide, phenols, cyanide, formaldehyde, ammonia, methacrylic acid, vitriol and phosgene—the latter a gas used to poison people on purpose during World War I. The workmen largely ignored the order ("gas masks are uncomfortable") and the state failed to enforce it. Even now, ominous little news items buried at the bottom of newspaper columns report that 10 or 15 or 20 workers were carted off to the hospital for treatment after they had inhaled too many fumes of one kind or another.

Throughout the dragging months and years, international crusaders and UNESCO have maintained a stiff upper lip, and in their annual reports have dwelt upon whatever accomplishments they could claim. They have been unfailingly polite to the Italian bureaucracy, although noting from year to year that "We regret this new delay," "What is needed is no possibility of further delay. . . ." and so on.

Sir Ashley Clarke and Venice in Peril Fund came to rescue of San Niccolò dei Mendicoli (background).

John McAndrew, head of Save Venice, Inc., near church (opposite page) which American group saved.

Their faith may be rewarded. Inner-city pollution has definitely been reduced by the switch to methane. Many artesian wells have been capped, and one new aqueduct has been completed to bring water from the Sile River to the gulping mainland factories (p. 45). A second aqueduct is on the drawing board, and four pilot sewage plants are in various stages of development. The first doesn't work very well, but maybe the builders will learn by doing.

Italian authorities claim proudly that almost one-third of the total allocation of money has been made (although one-third of that is being held in reserve to cover tenders for the ill-conceived effort to close the channels). Much of the money is being consumed in studies and drawing-board work.

But an international training course for the care and cure of ailing stone, organized and sponsored by UNESCO, is now being held annually in Venice. Then there is the new restoration laboratory in San Gregorio. Eventually the world's aspiring restorers may learn there how to save everything from canvas to marble to wood to glass.

And there has been no disastrous flood in more than a decade. The *acque alte* have receded in intensity if not in frequency, and new scientific measurements indicate that the subsidence of the city has stopped. It might even be rising almost imperceptibly, as underground waters begin to fill the gaps made earlier by the gulping artesian wells.

Finally, no mere foreigner should ever discount the Italians' genius for the last-minute save. If they didn't invent *The Perils of Pauline,* they should have: nobody else is so expert at cutting the bonds of the lady just before the train thunders through, or in leaping from the top of a burning building into a fortuitously passing hay wagon.

Sometimes the save is done thoughtfully instead of instinctively. An organization called the Friends of Museums and Monuments of Venice currently transports children from the industrial zone to the historic center to see the glories of St. Mark's, San Rocco, the Doge's Palace, the Rialto Bridge. The volunteers who run the tours report that 85 percent of these children, Venetians by definition and separated by only 15 minutes of public transport from the historic center, had never seen it before. If these children learn to love old Venice, and if politicians and technicians of all orders can solve one of the knottiest problems of the 20th century, then *La Serenissima* will, truly, rise again.

Glistening restoration of church of Santa Maria dei Gesuiti gives no hint of its once-parlous state. U.S. funds kept it from falling into canal.

OPERATION DOUBLE THE PACIFIC COAST.

Some of the richest, most productive forests on this green earth are found on the Pacific Coast of the United States.

They make up just 13.5 percent of the nation's commercial forestland*. Yet produce more than a third of our wood.

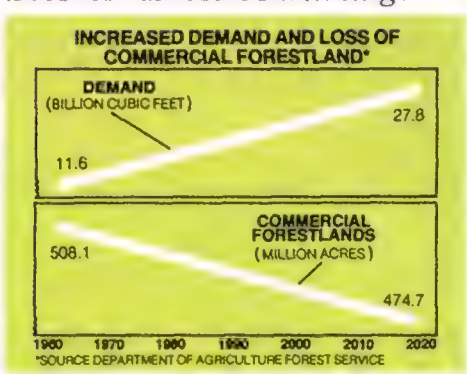
These are the forests of legend—a rich forestland where Paul Bunyan would have felt at home. A green belt 100 miles wide from California to Alaska.

Large portions of this land have already been harvested once to give us lumber for homes, paper, pulp, packaging and a thousand wood products. Now a new generation of trees has taken their place. Trees that will grow stronger, faster, thanks to the twentieth century science of forest management.

The forest industry calls this kind of intensive forest management Operation Double Tree, a way to get twice the wood from a given amount of land. It's a nationwide effort, but when foresters and economists talk about the need to double or triple our wood supply by the year 2020, the incredibly productive forests of the Pacific Coast will play a key role.

Operation Double Tree: Why it's needed and how it works.

While the world demand for wood is *increasing*, the amount of productive land available for growing trees for harvest is *shrinking*.



In the U.S. alone, the demand for wood and paper products is expected to double in less than 50 years.

Thus the reason behind Operation Double Tree—the forest industry's name for intensive forest management that can double the amount of wood from the nation's productive forestland. And do it in such a way that everyone can share in the multiple benefits of the forest.

Management Makes The Difference.

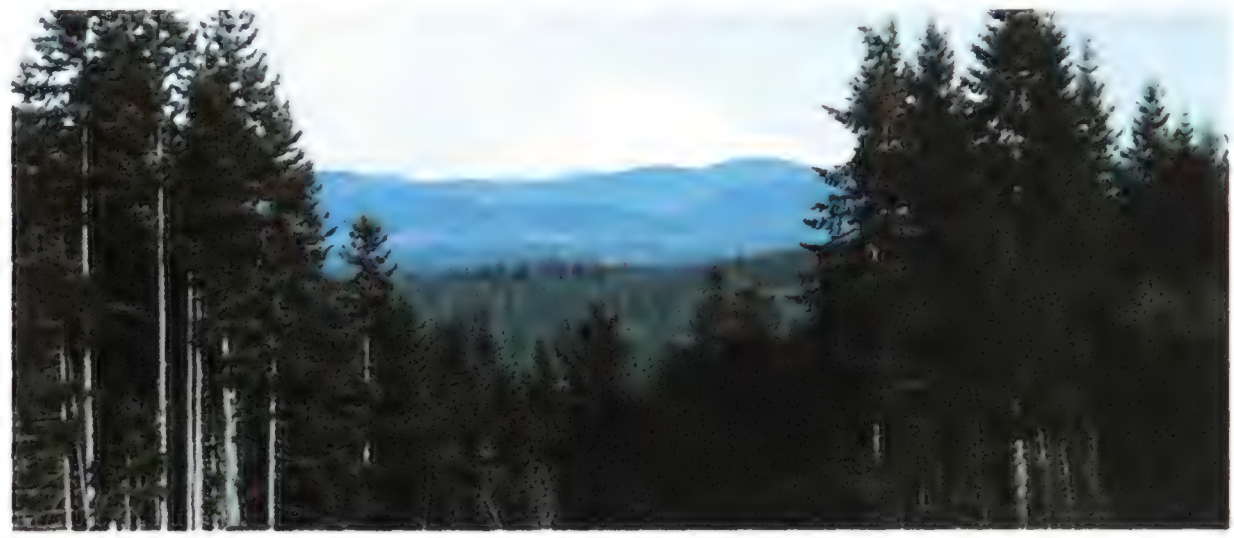
The Pacific Coast forests owe their great productivity to nutritive soils, moist climate and some of the best forest management in the world. Washington State is one good example. Its Department of Natural Resources takes Washington's nickname, the Evergreen State, seriously. State foresters plant, thin, harvest and plant again to keep their forests green and growing.

Everyone shares the benefits of Washington's multiple-use forests. There's lumber for housing. Jobs. Revenue for schools. Places to camp, and fish. And forest homes for wildlife.

All these things are possible because wood is one natural resource that is renewable. And modern forestry has found new ways to make Mother Nature more productive.

The New Trees.

Forest products companies, large and small ones alike, are also taking advantage of the Pacific Coast's tree-growing ability. Superior seedlings that will grow stronger, faster, are being raised by the millions in special tree nurseries run by companies like Weyerhaeuser, Georgia-Pacific, Simpson and Pope & Talbot. When they are two



The incredibly productive evergreen forests of the Pacific Coast provide more than a third of our nation's wood today.

The two Douglas firs here are both 25 years old. Both grew in the Cascades of Washington. But the bigger one grew in a managed area, while the smaller one did not. Both are shown 47 percent of actual size.

TREE IS WORKING ON

Genetic research is the key to future forests.

years old, these hearty seedlings are hand planted in a newly harvested area, giving the new forest a five-year head start over natural regeneration.

As the trees grow, they're protected from insects, fire and other natural enemies. Slow growers and competing brush are thinned out to give the best trees room to grow. And helicopters are brought in to deliver the extra nutrients that will give the young forests an added burst of growth.

The result is a better quality forest, often more than twice as productive as the generations before it.

Of all the trees on the coast, the redwoods are the most famous. And much of the land where these older giants grow has been set aside by government, companies, and private landowners.

In this way, the larger coastal redwoods will always be protected and preserved as a national heritage for future generations.

But further inland, beyond the picture postcards, the younger stands of privately-owned, commercial redwoods have a more productive future.

What most people don't realize is, redwoods are among the most prolific, fastest-growing trees in America. Now companies like Louisiana Pacific are applying intensive forest management techniques and achieving remarkable results.

Through careful thinning and fertilization, the new redwood forests are producing trees that will be ready to harvest in 50 to 60 years, about half the usual time.

A Long Way To Go.

So there's progress with Operation Double Tree along the Pacific Coast, and in forests all across the country. But we still have a long way to go.

On the average, industry lands grow 50 percent more wood than the lands owned by government and private individuals. Yet, even here, there's room for improvement.

Overall, the American forest is only half as productive as it could be. And this low productivity is a waste of one of our most valuable natural resources.

Not only is wood our busiest building material, it also provides countless jobs.

But working together, all timber growers—private owners, industry and government—can learn to make the most productive use of our remaining commercial forests.

Industry has invested millions to make the concept a reality. But money isn't enough.

Leaders and landowners alike must understand the problem. And, more important, the solution.

For more information, write for our free booklet, "Managing the Great American Forest," American Forest Institute, P.O. Box 873, Springfield, VA 22150.

**Commercial forest is that portion of the total forest which is capable of, and available for, growing trees for harvest. Parks, wilderness and primitive areas are not included.*

Trees. The Renewable Resource.

Two bull wildebeests settle a dispute over mating rights. Lorenzians point to such fights as examples of the aggression that is in all animals, including humans. But the authors point out that this

By Richard E. Leakey and Roger Lewin

Is it our culture, not our genes, that makes us killers?

The scion of a fabled archaeological family challenges the Lorenzian view of humans as "killer apes" who happen to wear clothes

"The blood-bespattered, slaughter-gutted archives of human history from the earliest Egyptian and Sumerian records to the most recent atrocities of the Second World War accord with early universal cannibalism, with animal and human sacrificial practices or their substitutes in formalized religions, and with the world-wide scalping, head-hunting, body-mutilating and necrophilic practices of mankind in proclaiming this common bloodlust differentiator, this predaceous habit, this mark of Cain that separates man dietetically from his anthropoidal relatives and allies him rather with the deadliest of Carnivora." The message of these stirring words, written by Paleoanthropologist Raymond Dart, is clear: humans are unswervingly brutal, possessed of an innate drive to kill each other.

On the same subject, the Nobel Prize winner Konrad Lorenz, one of the founders of modern ethology, wrote with even more eloquence: "There is evidence that the first inventors of pebble tools—the African australopithecines—promptly used their weapons to kill not only game, but fellow members of their species as well. Peking Man, the Prometheus who learned to preserve fire, used it to roast his brothers: beside the first traces of the regular use of fire lie the . . . roasted bones of *Sinanthropus pekinensis* himself."

Lorenz sounded these dramatic phrases 14 years ago

Adapted from the book *ORIGINS: What New Discoveries Reveal About the Emergence of our Species and its*

is ritualized combat, a test of strength, in which the loser will not be killed or even injured.

Author Leakey painstakingly recovers more evidence of Man's past at the Lake Turkana site in Kenya.

in his celebrated book *On Aggression,* the main burden of which is that the human species carries with it an inescapable legacy of territoriality and aggression, instincts which must be ventilated lest they spill over in ugly fashion. All these—archaeological evidence of cannibalism, the notion of territorial and aggressive instincts, of an evolutionary career as killer apes—were woven together to form one of the most dangerously persuasive myths of our time: mankind is incorrigibly belligerent; war and violence are in our genes.

This essentially pessimistic view of human nature was assimilated with unseemly haste into a popular conventional wisdom, an assimilation that was further enhanced by Desmond Morris (with *The Naked Ape*) and Robert Ardrey (with *African Genesis, The Territorial Imperative, Social Contract,* and more recently *The Hunting Hypothesis*). We emphatically reject this conventional wisdom for three reasons: first, on the very general premise that no theory of human nature can be so firmly proved as its proponents imply; second, that much of the evidence used to erect this aggression theory is simply not relevant to human behavior; and last, the clues that do impinge on the basic elements of human nature argue much more persuasively that we are a cooperative rather than an aggressive animal.

Konrad Lorenz, who made innate aggression part of our self-image, feeds one of the geese he studied.

Possible Future by permission of the publisher, E. P. Dutton.
Copyright Richard E. Leakey and Roger Lewin 1977.

Tribal dance of New Guinea "Mudmen" is said to mark a great battle in their history; now it is ritual.

The rules for human behavior are simple, we believe, precisely because they offer such a wide scope for expression. By contrast, the proponents of innate aggression try to tie us down to narrow, well-defined paths of behavior: humans are aggressive, they propose, because there is a universal territorial instinct in biology; territories are established and maintained by displays of aggression; our ancestors acquired weapons, turning ritual displays into bloody combat, a development that was exacerbated through a lust for killing. And according to the Lorenzian school, aggression is such a crucial part of the territorial animal's survival kit that it is backed up by a steady rise in pressure for its expression. Aggression may be released by an appropriate cue, such as a threat by another animal, but in the protracted absence of such cues the pressure eventually reaches a critical point at which the behavior bursts out spontaneously. The difference between a piece of behavior that is elicited by a particular type of stimulus, and one that will be expressed whether or not cues occur is enormous, and that difference is central to understanding aggression in the human context.

There is no doubt that aggression and territoriality are part of modern life: vandalism is a distressingly familiar part of the urban scene, and there is war, an apparent display of territoriality and aggression on a grand scale. Are these unsavory aspects of modern living simply part of an inescapable legacy of our animal origins? Or are they phenomena which have entirely different causes?

To begin with, it is worth taking a broad view of territoriality and aggression in the animal world. Why are some animals territorial? Simply to protect resources, such as food, a nest or a similar reproductive area. Many birds defend one piece of real estate in which a male may attract and court a female, and then move off to another one, also to be defended, in which they build a nest and rear young. Intruders are soon met with territorial displays, the intention of which is quite clear. The clarity of the defender's response, and also of the intruder's prowess, is the secret of nature's success with these so-called aggressive encounters.

Richard Leakey, like his famous mother and father, continues to push back the date at which true humans emerged from the evolutionary process. Roger Lewin is the science editor of New Scientist.

SEAGRAM'S CROWN ROYAL. 86 PROOF CANADIAN WHISKY. 86 PROOF. SEAGRAM DISTILLERS CO., N.Y., N.Y.

Have you ever seen a grown man cry?

Two sage-grouse cocks settle dispute over territory with rival displays; neither one will be injured.

Such confrontations are strictly ritualized, so that on all but the rarest occasions the biologically fitter of the two wins without the infliction of physical damage on either one. This "aggression" is in fact an exercise in competitive display rather than physical violence. The biological common sense implicit in this simple behavioral device is reiterated again and again throughout the animal kingdom. For a species to transgress, there must be extremely unusual circumstances. We cannot deny that with the invention of tools, an impulse to employ them occasionally as weapons might have caused serious injury, there being no stereotyped behavior patterns to deflect their risk. And it is possible that our increasingly intelligent prehuman ancestors may have understood the implications of power over others through the delivery of one swift blow with a sharpened pebble tool. But is it likely?

The answer must be no. An animal that develops a proclivity for killing its fellows thrusts itself into an evolutionarily disadvantageous position. Because our ancestors almost always lived in small bands, in which individuals were closely related to one another, and had as neighbors similar bands which also contained blood relations, in most acts of murder the victim would more than likely have been kin to the murderer. As the evolutionary success is in the production and well-being of as many descendants as possible, an undifferentiated innate drive for killing individuals of one's own species would soon have wiped that species out. Humans, as we know, did not blunder up an evolutionary blind alley, a fate that innate, unrestrained aggressiveness would undoubtedly have produced.

To argue, as we do, that humans are innately nonaggressive toward one another is not to imply that we are of necessity innately good-natured toward our fellows. In the lower echelons of the animal kingdom the management of conflict is largely through genetically-seated mock battles. But farther along the evolutionary path, carrying out the appropriate avoidance behavior comes to depend more and more on learning, and in social animals, the channel of learning is social education. The capacity for that behavior is rooted in the animal's genes, it is true, but its elaboration depends also on learning.

For instance, among the Micronesian Ifaluk of the western Pacific, real violence is now so thoroughly condemned that "ritual" management of conflict is taught in childhood. The children play boisterously, as any normal children do; however a child who feels that he or she is being treated unfairly will set off in pursuit of the offender—but at a pace that will not permit catching up. As other children stand around, showing looks of disapproval, the chase may end with the plaintiff throwing pieces of coconut at the accused—once again with sufficient care so as to miss the target! This is ritual conflict, culturally based, not genetic.

Animal conflict occurs both between animals of different species and between individuals of the same

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GENERAL ELECTRIC

species, and under differing environmental conditions. Anyone who argues for inbuilt aggression in Homo sapiens must see aggression as a universal instinct in the animal kingdom. It is no such thing. Much of the research on territoriality and aggression concerns birds. Because they usually must build nests, in which they will then spend a good deal of time incubating eggs, and still longer rearing their young, it is a biological necessity for them to protect their territory. It is therefore not surprising that most birds possess a strong territorial drive. But simply because greylag geese and mockingbirds, for instance, enthusiastically defend their territory, we should not infer that all animals do so. And it is not surprising that hummingbirds show considerably more territorial aggression than lions, even though the king of beasts is a lethal hunter. Our closest animal relatives, the chimpanzees and gorillas, are notably nonterritorial. Both of these species are relatively mobile and so they can forage for food over a wide area.

The animal kingdom therefore offers a broad spectrum of territoriality, whose basic determining factor is the mode of reproduction and style of daily life. Indeed, an animal may find it necessary to assert ownership of land in one situation and not in another.

That territoriality is flexible should not be surprising. If food resources and space are scarce, then there may well be conspicuous territorial behavior. Some individuals will fail to secure sufficient food or a place in which to rear a brood. These individuals are, of course, the weakest, and this is what survival of the fittest through natural selection really means.

Territorial behavior is therefore triggered when it is required and remains dormant when it is not. The Lorenzians, however, take a different view: aggression, they say, builds up inexorably, to be released either by appropriate cues or spontaneously in the absence of

Looters take advantage of a power failure in New York. The authors contend that such violence

appropriate cues. A safety valve suggested by Lorenzians for human societies is competitive sport. But such a suggestion neglects the high correlation between highly competitive encounters and associated vandalism and physical violence—as players, referees and crowds know to their cost through Europe and the Americas. More significantly, research now shows a close match between warlike behavior in countries and a devotion to sport. Far from defusing aggression, highly organized, emotionally charged sporting events generate even more aggression and reflect the degree to which humans' deep propensity to group identity and cohesion can be manipulated.

We can say therefore that territoriality and aggression are not universal instincts as such. Rather they are pieces of behavior that are tuned to particular lifestyles and to changes in the availability of important resources in the environment.

is a product of the culture in which they find themselves and not unavoidable genetic proclivities.

When the practice of hunting and gathering was becoming firmly rooted in the fertile soil of prehuman society, our ancestors would of course not have operated sophisticated kinship networks. But we do know that chimpanzees know who are their brothers and sisters and who are not. And we know too that chimpanzees and baboons do migrate between their various troops. The biological benefits of reducing tension and conflict between groups through exogamy almost certainly would have been achieved early in hominid evolution. The notion of hostile neighboring hordes is an image born of the mistaken belief in a belligerence written ineradicably into the human genetic blueprint.

Food shortage, either on the hoof or rooted in the ground, must nevertheless have been a cause of potential conflict between bands. Indeed, severe famine may well have forced hominids into belligerent confrontation with one another in open competition for the scarce food. And the band that lost out may even have ended as the victors' supper. But there is neither evidence nor any reason to suggest that hominid flesh, either roasted or raw, appeared on our ancestors' diet specifically as a source of food, in any but the most extreme circumstances. A much more likely consequence of conflict over food resources, so far as can be judged from what we know of both animals and present-day hunter-gathers, would have been the dispersal of bands and even the temporary scattering of individuals, a practice that ensures the best use of the limited food that is available.

Along with lions, humans are one of the few mammals who on occasion deliberately eat each other. When a male lion wins control of a pride, he will often consume the young cubs and set about producing offspring of his own. Ruthless and wasteful though it may appear, the biological reason for the dominant male's behavior is evident: the offspring produced by the pride will have been sired by a very powerful animal, providing a brutal but efficient method of natural selection. Cannibalism in humans, however, takes place for different reasons.

Two kinds of human cannibalism

Broadly, there are two sorts of cannibalism and the distinction between them is crucial. First, there is the eating of members of one tribe of individuals by another—usually as the end result of raids; such is the conventional version of the practice, and it is known as exocannibalism. In the second form, known as endocannibalism, people eat members of their own tribe.

Human cannibalism takes place primarily as part of some kind of ritual. Even among the infamous tribes in the highlands of New Guinea, the context is one of extensive tribal ritual. Months of preparation—weaving symbolic adornments and the carving of elaborate wooden images—precede a raid, and it is abundantly clear that the entire exercise has a powerful unifying effect on the tribe. The habits of the New Guinea tribes are, in any event, extremely rare, and as against cannibalism manifested in this extreme form we may set the other extreme, in which people swallow a small morsel of a dead relative as a mark of love and respect.

Altogether, then, the notion that humans are inherently aggressive is simply not tenable. We cannot deny that 20th-century humans display a good deal of aggression, but we cannot point to our evolutionary past either to explain its origins or to excuse it. There are many reasons why a youth may "spontaneously" smash a window or attack an old lady, but an inborn drive inherited from our animal origins is probably not one of them. Human behavior is extraordinarily sensitive to the nature of the environment, and so it

should not be particularly surprising that a person reared in unpleasant surroundings, perhaps subjected to material insecurity and emotional deprivation, should later behave in a way that people blessed with a more fortunate life might regard as unpleasant. Urban problems will not be solved by pointing to supposed defects in our genes while ignoring real effects in social justice.

The fallacy of thus adducing our animal origins should be evident for wars as well. Wars are planned and organized by leaders intent on increasing their power. In war men are more like sheep than wolves: they may be led to manufacture munitions at home, to release bombs from 10,000 feet up, or to fire long-range guns and rockets—all as part of one great cooperative effort. It is not insignificant that those soldiers who engage in hand-to-hand fighting are subjected to an intense process of desensitization before they can do it.

With the growth of agriculture and of materially based societies, warfare has increased steadily in ferocity, culminating in our current capability to destroy even the planet. We should not look to our genes for the seeds of war; those seeds were planted when, 10,000 years ago, our ancestors for the first time planted crops and began to be farmers. The transition from the nomadic hunting way of life to the sedentary one of farmers and industrialists made war possible and potentially profitable.

Possible, but not inevitable. For what has transformed the possible into reality is the same factor that has made human beings special in the biological kingdom: culture. Because of our seemingly limitless inventiveness and our vast capacity for learning, there is an endless potential for difference among human cultures, as indeed may be witnessed throughout the world. An important element of culture, however, consists in those central values that make up an ideology. It is social and political ideologies, and the tolerance or lack of it between them, that brings human nations to bloody conflict. Those who argue that war is in our genes not only are wrong, but in addition they commit the crime of diverting attention from the real cause of war.

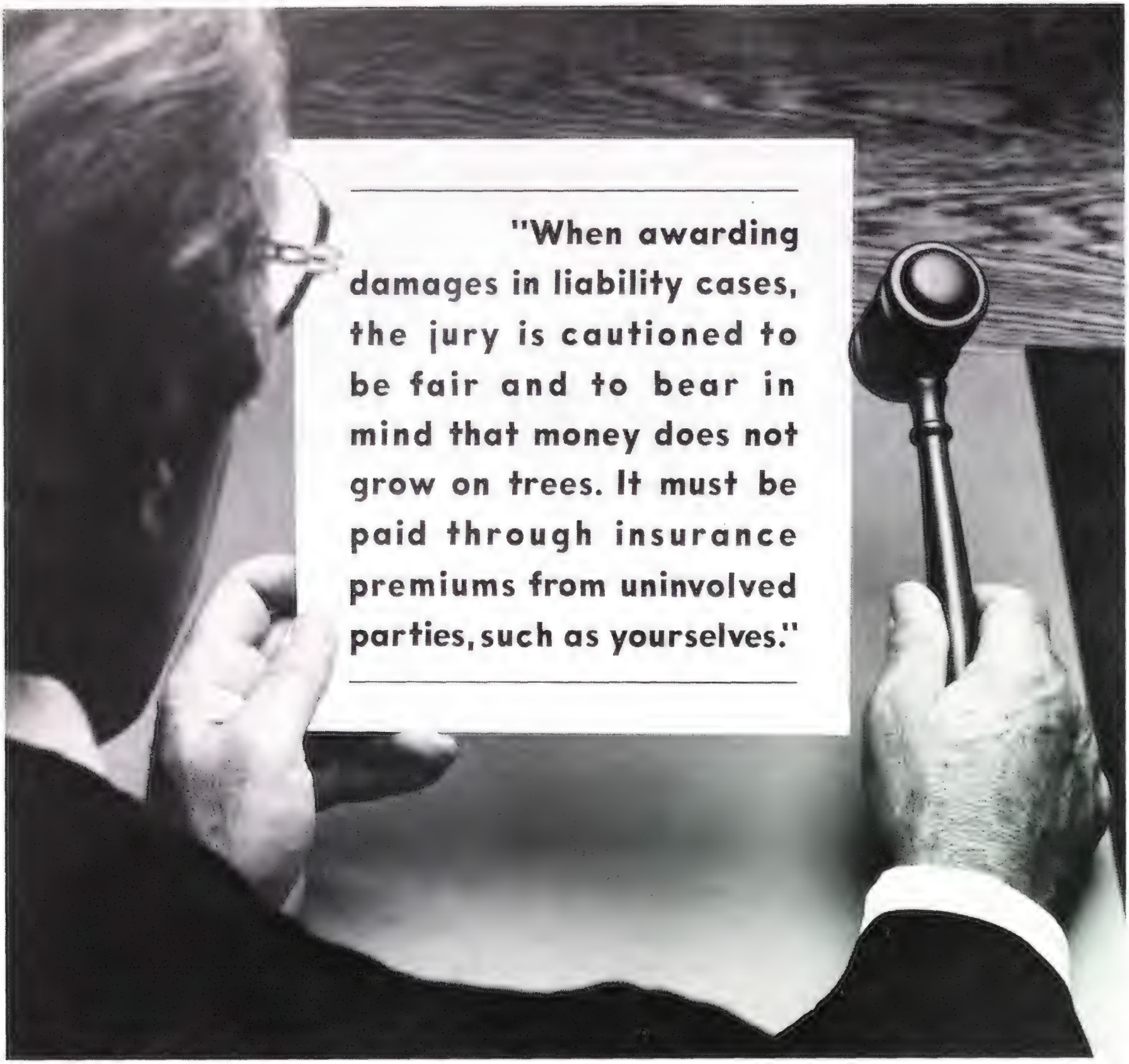
One supreme biological irony underlies the entire issue of organized war in modern societies—the cooperative nature of human beings. Throughout our recent evolutionary history, particularly since the rise of a hunting way of life, there must have been extreme selective pressures in favor of our ability to cooperate as a group: organized food-gathering and hunts are successful only if each member of the band knows his task and joins in with the activity of his fellows. The degree of selective pressure toward cooperation, group awareness and identification was so strong, and the period over which it operated was so extended, that it can hardly have failed to have become embedded to some degree in our genetic makeup.

We are not suggesting that the human animal is a cooperative, group-oriented automaton. That would negate what is the prime evolutionary heritage of humans: their ability to acquire culture through education and learning. We are essentially cultural animals with the capacity to formulate many kinds of social structures; but a deep-seated urge toward cooperation, toward working as a group, provides a basic framework for those structures.

Unfortunately, it is our deeply rooted urge for group cooperation that makes large-scale wars not only possible, but unique in their destructiveness. Animals that are essentially self-centered and untutored in coordinated activity could neither hunt large prey nor make war. Equally, however, massive warfare would not be possible without the inventive intelligence that has produced the increasingly sophisticated hardware of human conflict. It is therefore as unhelpful to blame the scourge of war on our cooperativeness as it would be to blame it on our intelligence. To do either is to evade the real issue—those ideological values and behavioral habits on which nations are based, through which governments manipulate their people.

If we wish to, we can change our social structures without any fear of some primal urge welling to the surface and sucking us back into some atavistic pattern. We are, after all, the ultimate expression of a cultural animal; we have not totally broken free of our biological roots, but neither are we ruled by them.

At Makapansgat in South Africa, where hominid skulls were found, the search for Man's history goes on.


"When awarding damages in liability cases, the jury is cautioned to be fair and to bear in mind that money does not grow on trees. It must be paid through insurance premiums from uninvolved parties, such as yourselves."

Too bad judges can't read this to a jury.

In a small Florida town, a decorative boulder rests on the median of a road. A man with three drinks in him and no sleep for 18 hours smashes his car headlong into it. *A jury orders the town to pay him $4.7 million in damages.*[1]

A truck without brake lights is hit from behind. For

"psychic damages" to the driver, because his pride was hurt when his wife had to work, *a jury awards $480,000 above and beyond his medical bills and wage losses.*

Then there's the one...but *you* can probably provide the next example. Most of us know hair-raising stories of windfall awards won in court.[2] Justified claims should be compensated, of course. Ætna's point is that it is time to look hard at what windfall awards are costing.[3]

What can we do? Several things:

We can stop assessing "liability" where there really *was* no fault—and express our sympathy for victims through other means.

We can ask juries to take into account a victim's *own* responsibility for his losses. And we can urge that awards realistically reflect the actual loss suffered—that they be a fair *compensation,* but not a reward.[4]

Insurers, lawyers, judges—each of us shares some blame for this mess. But it is you, the public, who can best begin to clean it up. Don't underestimate your own influence. Use it, as we are trying to use ours.

Ætna wants insurance to be affordable.

[1] This case is being appealed by the town. In addition to the court-awarded damages, two other defendants (the contractor and the county) settled out of court for an additional $1.15 million. This illustrates how extravagant jury-awarded damages set a standard for extravagant *out-of-court* settlements—the real problem, since most liability cases *are* settled out of court.

[2] A by-product of such awards has been a quantum leap in the number of all kinds of suits filed. Products liability cases *alone* have increased from 50,000 a year in the 1960's to almost a million a year now.

[3] Most awards are paid by insurance, and insurance companies spend millions more defending policyholders against lawsuits. The direct result is rising premiums for automobile and other liability coverages. The *indirect* result is higher prices for goods and services—prices which are boosted to cover the skyrocketing insurance premiums of manufacturers, doctors, hospitals, and others who are targets for windfall awards.

[4] For example, it would help if juries were simply required to take into account payments the claimant has already received for medical bills and lost wages. Under the present system, these bills may be paid all over again.

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LIFE & CASUALTY

Figurine from the Stanley Siegel Collection

Corner of exhibit displays some exotic techniques of surface decoration, including sharkskin-covered desk, one in Art Nouveau design, Art Deco screen, Nymphenburg figure, Meissen dog, Sandos vase.

Photographs by Yale Joel

By Russell Lynes

Cooper-Hewitt and its concern for American taste

The Smithsonian's National Museum of Design offers a rich and choice exhibition —and therewith starts fulfilling its mission

Energetic granddaughters of Peter Cooper, Eleanor Garnier Hewitt (top) and Sarah Cooper Hewitt, helped realize his dream of a museum for everyone.

It would be inaccurate to say that, rich as it is, the cream of the Cooper-Hewitt Museum's collection is on exhibition this month for the first time. The museum's store of cream is so thick and so rich that what presently adorns the walls and cases of the former Carnegie Mansion in New York, where the museum now abides, is merely a suggestion, a teaspoonful, of what is usually out of sight if not out of reach.

Just a year ago the Cooper-Hewitt, which is the Smithsonian's National Museum of Design, opened its new home with an exciting exhibition called "Man Transforms" (SMITHSONIAN, November 1976), which was, depending on one's reaction, either outrageous or enchanting. If that was "hard rock," this is waltz and minuet and two-step, and thus closer to the tempo of the museum at 2 East 91st Street, which for more than three-quarters of a century has been assembling a collection of decorative arts and designs second only to those of the Victoria and Albert in London and the Musée des Arts Décoratifs in Paris.

"Man Transforms" was intended to shock those who saw it into a realization that design is inherent in everything we look at or touch. The current exhibition, "More Than Meets The Eye," all of which comes from the museum's collection, says quietly and enticingly: "Look again. There's far more here than a hasty examination reveals. Consider what lies beyond simple usefulness that determines the design and ornamentation of a man-made object—its sources of inspiration in nature, in literature, in events and in former styles,

the manner of its construction, the persons or institutions that commissioned it (patrons, that is), and the techniques of its embellishment—painting, printing, engraving, carving, stamping, dyeing, and so on. Here to show you what we mean are textiles, drawings for buildings, triumphal arches, ballrooms, follies and coaches, objects of glass and porcelain, leather and wood and metal, of papier-mâché and plastics and of precious stones, each in its way a treasure, a delight and a messenger."

Cooper-Hewitt, the "newest old museum," as its director, Lisa Taylor, calls it, is an institution with a message, and though until very recently it imparted it largely to the design family, it has now raised its voice for all to hear. In July, when the museum was open in the evening, as it is once a week, 1,500 visitors had come through its massive wrought-iron and glass doors. "That's more people than we used to have in a year when we were downtown," Mrs. Taylor said.

Peter Cooper, who in 1852 laid the cornerstone of Cooper Union, a free school for training New York children of the working class in the sciences, mechanical arts and design, had in the back of his mind that a floor of his impressive stone-and-brick building should one day be devoted to a museum. There was no such thing in New York in Cooper's time except P. T. Barnum's emporium of hoaxes, gadgets, uplift, exotica and nature's dirty tricks. But before Cooper had got around to establishing his museum (though he had gone so far as to buy a stuffed white whale to show in it and he had plans for a cosmorama), other public-spirited citizens in the 1860s were planning the Metropolitan Museum of Art and the American Museum of Natural History.

When Cooper died in 1883 his hankering for a museum at Cooper Union did not die with him. It stuck in the minds of his three granddaughters, Amy, Sarah

Design for archway celebrating wedding of Dauphin of France to Infanta Maria Theresa of Spain, 1745.

In about 1802, Jean-Pierre-Louis Houël made this sketch for a Parisian public monument, never built.

Model of 1930 Marmon Sixteen Sedan designed by Walter Dorwin Teague and son Walter jr. stands proudly before the freewheeling cartoon for a printed velvet *Farfalle*, by Clayton Ryder and Harvey Smith.

and Eleanor Hewitt, and they were the sort of energetic incubators to bring it to life. Amy Hewitt Green, whom Cooper called "an excellent girl of humble disposition," played a minor role, but Sarah ("full of life and gaiety") and more particularly Eleanor, neither of whom married, had the drive and dedication and imagination to turn what from the beginning was a modest echo of the Musée des Art Décoratifs into a characteristic Cooper institution. This was to be no museum for the private pleasures of curators and dilettantes, as so many European museums then were; it was for anyone who wanted to use it as a place to work and learn. There were to be, Eleanor said, "no tedious restrictions and formalities" to be gone through; "anyone who stopped at the General Office of the Cooper Union and asked for a card" was welcome.

The Misses Hewitt had more in mind than merely realizing a dream of their grandfather. Their mission was to help save American taste from a fate worse than commercialism and vulgarity. They were appalled at what they saw around them—"the tormented and overdecorated hardwood trims and atrocities of the degenerate furniture and ceramic forms," in Eleanor's words, which were dear to the hearts of Victorian ladies and gratified the ambitions for opulence of their husbands. The Hewitt sisters believed, as their grandfather had, that education was the cure for all ills and that beautiful European and Oriental examples would refine the visions and guide the pencils of American designers. Their own education in the decorative arts, Eleanor wrote, came from early and continual exposure in their father's library to copies of the *Illustrated London News*, the *London Graphic*, books such as Nash's *England* and *Polychromatic Ornament* by Owen Johnson, and dozens of other unlikely volumes to find in a politician's library. Their father, Abram Stevens Hewitt, who besides being Cooper's son-in-law and partner in the iron business was briefly mayor of New York (he defeated Theodore Roosevelt for election), was a man of sensibility who, when scarcely more

Former Harper's *editor Russell Lynes, the author of several books, including one on New York's Museum of Modern Art, is fascinated by museums.*

The Funeral Procession of Lord Viscount Nelson
to St. Paul's Cathedral Jan.y 9th 1806
PALMAM QUI MERUIT FERAT
NEC

than a boy, had walked over much of Europe (he conversed in classical Greek in Greece and in Latin in Italy) and he encouraged his daughters in the pursuit of the arts. His "French ancestry," Eleanor wrote rather disarmingly, "had given him innate love of art and true discrimination," something, to be sure, it did not give all Frenchmen, though Eleanor would have been reluctant to suggest it.

The energetic sisters who boasted of being pioneer sportswomen and claimed not only to have "imported the first game of lawn tennis from London" but loved to ride, drive, skate and hunt, started collecting when they were not yet 16 with pigtails down their backs. They bought at auction in New York half of the Jervis collection of ancient textiles (the earlier half—12th to 16th centuries) "purely for our own pleasure," and they chose the earlier ones because, Eleanor said, they would "possess greater technical and artistic value than the 17th and 18th century part." Not only were the Hewitt girls precocious—they were, by New York standards of the day, eccentric. They organized and played in an "all girl" orchestra, a dozen young ladies in white dresses and blue sashes, which was an artistic rather than a feminist venture. When they were asked to perform in celebration of the Women's Suffrage Association, they declined. An intense interest in politics seems not to have been one of the concerns they inherited from their father.

J. Pierpont Morgan, the booming financier, played, as he did in so many New York cultural enterprises, a role at once whimsical and pivotal in the development of the Cooper Union Museum of Design. On the eve of a trip to Europe in 1901 he met Mr. Hewitt at a men's dinner and asked him what his daughters were interested in at the moment. Hewitt said that they had their eyes on the "unique Badía collection of textiles" that was up for sale in Barcelona, and Morgan asked that "all the papers relating to it be sent to him that night." Morgan, who did nothing by halves, cabled Hewitt a few weeks later: "Have purchased the Badía Collection of Barcelona, also the Vivés Collection of Madrid, and the Stanislas Baron Collection of Paris. I do this to give your daughters pleasure." This windfall put the budding museum in the same class with London's South Kensington Museum (now the Victoria and Albert) so far as textiles were concerned, and it boasted that it possessed "six pieces that do not exist in the superb Berlin Museum."

The model for what is now the Cooper-Hewitt Museum was neither English nor German but the Musée

Silk damask, a delicate fabric, is embroidered with silk-and-metallic thread using long, flowing stitches.

des Arts Décoratifs in Paris, to which, whenever they could make an opportunity, the girls hied themselves. They found amused and friendly advice and help there; the director was pleased by the audacity and self-assurance of the two young women, whose pigtails by that time were coiled around their heads, and arranged for them to have casts of decorative motifs by the greatest French "masters of ornament," a basic nucleus around which important parts of their collection were assembled. The girls' parents footed the bill, and it was they and their friends who, in the early days of the museum which opened on the fourth floor of Cooper Union in May 1897, nourished it with infusions of money, gifts and services.

Sometimes by small and patient steps and sometimes by windfalls (but none like Mr. Morgan's) the collections grew. So did their use by designers and students of design; so did the collection's reputation. By 1910 its "Encyclopedic Scrap Books" already numbered more than 1,000 volumes containing millions of reproductions of designs, supplemented in later years by hundreds of thousands of slides and photographs. (Should you, for example, like to see how the hummingbird or the calla lily has been adapted for use by designers, the Cooper-Hewitt can speedily produce hundreds of examples for you.) As these extraordinary archives grew so did the collection of drawings to more than 30,000 and prints to more than 20,000. So also grew the collections of textiles and decorative and useful objects, of games and birdcages, of furniture and frivolities and reflections of Man's pleasures and tragedies, vanities and beliefs as they have been transmuted into objects.

Fabric titled *Death and Funeral of Lord Nelson,* for upholstery, was made soon after his death in 1805.

Design for, and completed "cabbage leaf" Sèvres porcelain bowl, was made in France 1760-1775.

Vase from the Stanley Siegel Collection

French master René Lalique designed this molded decorated glass vase, ringed with a silver collar,

The collections and their use became too much for Cooper Union to cope with. The Union's primary mission was, and still is, to provide a specialized kind of education for what in Cooper's day was called "the worthy poor," and the expense of administering the design collection took too large a slice of the Union's limited funds. In 1963 the Union's trustees, hard-pressed, decided to shed the museum of design and if necessary disburse its collections. A howl of dismay went up in the art and design world, an alarm that with the help of the American Association of Museums brought about negotiations with the Smithsonian Institution to take the collection under its wing.

In 1972 the Carnegie Corporation gave its founder's 64-room mansion on upper Fifth Avenue to house the newly named Cooper-Hewitt Museum, a coupling of names which surely would have gratified both Cooper and his granddaughters. Extensive renovations in Andrew Carnegie's house have both maintained its opulent domestic character and created excellent exhibition spaces in the basement and on the first and second floors, and above them libraries and the collections of drawings, prints, wallpapers and textiles.

"More Than Meets The Eye" occupies the first and second floors and is, teaspoonful or not, more than even the most sophisticated eye can digest at one visit. I had a head start. Before the exhibition was installed but after the hundreds of pieces for it had been chosen by the Cooper-Hewitt curators, I had the pleasure of examining them one by one with authority instructing my eyes.

Dozens of drawings sorted into categories (sources of design, events inspiring design, methods of embellishment, kinds of patronage) bespeak the shape of the exhibition and its intent, represented in decorative and useful objects, in textiles, prints and wallpapers, in games and playful and illusionary gadgets.

The drawings range in seriousness from a remark-

in about 1925. The immaculate bonbonnières are the work of J. and L. Lobmeyr, made in Vienna, 1926.

Design for glass rose flute, ornament and ashtray, shown with a Lobmeyr rose flute, Vienna, 1926.

able 16th-century sketch for the base of a silver-gilt crucifix for the high altar of St. Peter's in Rome (now in its treasury) to the colored overlays on transparent plastic for *The Yellow Submarine;* from an 18th-century project for a fantastic monument for a Paris park (p.70), a terrestrial globe surmounted by a chariot and resting on clouds through which winged figures fly, to a drawing by the glassmakers J. and L. Lobmeyr made in Austria in 1926 for a vase so tall and fine and pure that a whisper would seem to make it vanish (right). There is a drawing, commissioned for the ceremonial visit of a pope, a palace facade dolled up with sculpture and garlands for the occasion, and another for a triumphal arch (p. 70) to celebrate the French Dauphin's marriage to the Infanta of Spain in 1745, a tremendous confection entitled *Gate of the Temple of Hymen.* There are drawings for fans, for an 18th-century bishop's catafalque bracketed by rather jaunty skeletons, for salons and dining rooms and ballrooms, including a design for the decoration of the ballroom of the Hotel Pierre (p.77) in New York, and for ceramics—especially drawings for tureens and bowls made by the Sèvres (opposite) porcelain works in France about 1770, all the more precious because the museum owns the pieces themselves, as it also does the Lobmeyr vase. There are delicate designs of birds and flowers for fabrics and wallpapers made in France in the 19th century, and a dignified procession of Japanese grasshoppers that is the antithesis of a bold splash of tremendous butterflies (p.71) designed in 1962 by Harvey Smith and Clayton Ryder to be printed on velvet.

The textiles in the exhibition, which date from the Renaissance to just yesterday and which demonstrate all manner of techniques of the needle, the bobbin, the loom and a great variety of methods of printing and dyeing and weaving, are, in effect, a garden and a woods, colorful, sometimes very formal, sometimes

nearly wild. Sometimes they are based as much on events, literary or actual, as on leaves and blossoms and the stems of vines, and made to celebrate or commemorate legends, occasions or heroes. There is a splendid 17th-century silk embroidery of *Judith and Holofernes* (a beheading which seems to have been a favorite subject of women artists) and by contrast a printed cotton commemorating the *Death and Funeral of Lord Nelson* (p. 72), made soon after his death in 1805. There are textile celebrations of London's Crystal Palace Exhibition of 1851, of Lindbergh's flight and our Bicentennial. The variety of uses of textiles, as the Cooper-Hewitt's first exhibition a year ago suggested, is almost infinite.

So, as the exhibition demonstrates, is the imagination that designers have applied to the structure and embellishment of the most useful and most frivolous objects, the most forthright and the most arch, the shyest and the vainest, the most solid and the most ephemeral. They are all here: a sleek black model of a Marmon Sixteen limousine (p. 71) designed by Walter Dorwin Teague and his son, a necklace from India of pearls from which hang rubies and sapphires and diamonds set in moonstones and tourmalines and aventurines. Here, too, is a statuette called *The Octopus Lady* (opposite), the work of a Belgian artist, Demètre Chiparus, in the 1920s. She stands on her toes, her ivory hands held high above her hooded ivory head, her body encased in what looks like brown snakeskin decorated with specks of gold. When I first saw her she was standing on a desk entirely covered in real sharkskin the color of silver, just a few feet from a pair of dark green lacquered screens (p. 68) on which a golden angel straddling what may be rocks or skyscrapers, King-Kong style, blows a curved hunter's horn.

Lady, desk, angel . . . all three are from the 1920s, extravagantly Art Deco and only a split personality away from the fragile Art Nouveau chair ornamented with mother-of-pearl by Carlo Zen and a bent plywood chair for a child by Charles Eames. Before very long these three distinct styles will, I suspect, be known just as "early 20th century" and be seen to have more in common than they now seem to. With them Hector Guimard, whose photograph looks out of a frame he designed and thought well enough of to sign (he was the most eminent protagonist of Art Nouveau in France) will find himself and his wavy hair that matches his wavy-topped frame very much at home. So, I suspect, will Louis Comfort Tiffany and his peacock vase of Favrile glass and René Lalique and his deep red cluster of scarabs blown and molded into a silver-collared vase (p. 74).

I do not mean to suggest that the decorative and useful objects in the exhibition are all from the recent past—far from it. There is, for example, a remarkable 17th-century lunette of wrought iron, an overdoor from the stables of the Chateau de Chantilly. There are 18th-century diamond brooches and pendants, a 16th-century green German tile that depicts in deep relief the story of *St. Martin and the Beggar*. There is elaborate Victorian parlor furniture of laminated wood and veneer by the American designer J. H. Belter, a decoupage (cut-out and pasted paper) screen of wreaths of flowers and golden vases by a friend of the Hewitts, Caroline King.

If the Misses Hewitt were earnest and ambitious for their museum, they were not stuffy. They liked games and illusions and toys, the more ingeniously designed to surprise and titillate the eye the better. And so there are peepshows, magic lanterns, puppets, kaleidoscopes, Zoetropes, little drawings that if flicked make moving pictures, illusionary gadgets like a *giocco di luce* (a boxed light game).

Peter Cooper, one can assume, would be gratified by what has become of his dream of a museum and proud of his granddaughters. Andrew Carnegie would be pleased that his house should be permanently hospitable to his friend and mentor whom he admired and whose philanthropies inspired his own. But who knows what Amy and Sarah and Eleanor would have thought? Nothing smug, one can be sure, nothing complacent. "Confusion, if it exist at all," Eleanor wrote, "only exists in the untrained mind of the onlooker." One can hear her say to Sarah, "This is all very well, but let's get on with it."

Exotic work in a hothouse setting, this eye-catching piece, *The Octopus Lady,* bronze and gold with ivory on onyx base, is by Demètre Chiparus; Belgium, 1925. In back, proposed mural for Hotel Pierre ballroom.

INTRODUCING THE NEW, LARGE AUDI 5000 AND THE EXTRAORDINARILY GIFTED ENGINEERS WHO DESIGNED IT.

Starting clockwise at the bottom of the picture and ending in the center. They are:

Ferdinand Piëch, Project Director: I designed racing cars before coming to Audi. But the Audi 5000 was a bigger challenge. A racing car can be designed to last for a few races only. That is its job. A passenger car has to do much more. Besides performing well, it must last a very long time. I knew we had assembled remarkable engineering talent. But they surprised even me.

Werner Schulze, Interior Design: A high-performance car doesn't have to have an interior like the cockpit of a fighter plane. I felt it was important for the Audi 5000 to have a comfortable atmosphere that was not distracting, the same as a driver would find in his home. It makes him a calmer, better driver.

Dr. Anton Wimmer, Structural Safety: A man named Timoshenko had a theory of construction which could help make safe cars. Yet no one had ever tried it. I did try it, and the results were remarkable. I believe it will take our competitors years to utilize this theory. Someday, perhaps, this construction could save your life.

Dr. Franz Behles, Assistant Director: The Audi 5000 is the largest German car for the money. Yet for all its size, it is also surprisingly lively. At about $8,500;* we feel there is no other car with our combination of room, handling, acceleration, and comfort.

Jörg Bensinger, Prototype Evaluation: We have been testing 100 cars in the United States and Canada for months before offering the first one for sale. It was the only way we could truly know how they perform in all weather conditions here. Other imports do not do this.

Hartmut Warkusz, Styling: It looks the way it does because it is functional. It is aerodynamically efficient, so it requires less machinery to move it. Beauty is one thing. But if the design had not worked in the wind-tunnel, it would have been thrown out.

Joseph Eibl, Chassis Design: It is better to pull a car than to push it, so I insisted on front-wheel drive. You have no idea the difference this can make, especially on wet or slippery roads. When you test-drive the Audi 5000, save it for a rainy day.

Dirk Bösenberg, Acoustics Testing: If you have grown accustomed to noise in imported high-performance cars, you must try the Audi 5000. It gives you superb performance, yet it will surprise you with its quietness. This is why I insisted on true high fidelity equipment as an option, instead of a simple radio.

Franz Hauk, Engine Design: When I proposed the 5-cylinder gasoline engine, my colleagues smiled. I insisted, even though no one had ever done it before. It wasn't easy. But now, I believe we have an engine that offers outstanding performance like a 6, and great efficiency like a 4. They smile a different smile now.

Dr. Fritz Naumann, Power Train Testing: We designed the Audi 5000 with as few moving parts as possible to make it reliable. Parts that are not in the car can never break. It wasn't easy. Sometimes I think they call it the Audi 5000 because that's how many dinners I missed. Please come in and drive it. It was a lot of work.

*Suggested 1978 retail price $8450. P.O.E., transp., local taxes, and dealer delivery charges additional.

Two papilionid butterflies form a kaleidoscopic Rorschach blot as they mate on a twig. The secret ingredient in such remarkable pictures is patience measured in years rather than minutes.

By Timothy Green

A man's obsession reveals the riches of a hidden world

Insect life is captured in a prize-winning film that took ten years, a lifetime's savings and some tense moments to make

Dr. Sung-Yang Lee stands with his wife, Manley, who stuck with him and the project through it all.

The next time you brush an insect aside or stamp it underfoot, pause to consider that you may have just destroyed a distinguished engineer, a devoted parent guarding its young, a master of camouflage who might have deceived Sherlock Holmes, or one of the world's great lovers.

A rare insight into the miniworld of insect society has been pieced together by a Nationalist Chinese entomologist on Taiwan, Dr. Sung-Yang Lee. His view of the insect domain has been vividly unveiled in a documentary movie, *The Hidden Events,* which in September won the award for the best commercial film at the Photographic Society of America's International Film Festival in Detroit. The still pictures on these pages were made at the same time as the movie.

Out in the rice fields, by the streams and up in the hills of Taiwan, Lee has focused on everything from the feeding habits of the young mantid and the aptly named assassin bug to the love life of the firefly and the craftsmanship of the paper wasp creating its nest by chewing up wood pulp. He has produced stunning portraits of that knight in armor, the mulberry trunk borer beetle, and of the green prominent caterpillar, looking its fiercest as it puffs up its head and flourishes its tail to ward off an enemy. He photographed a coreid bug laying cascades of golden eggs (p. 86) and a tiger beetle waiting to ambush a caterpillar. He caught a dramatic confrontation as a swallowtail butterfly larva drove off a wasp (cover) by emitting a foul-smelling gas, and observed the almost magical mating of *Papilio* butterflies (opposite). His film turned patiently as the female attelabid beetle carefully spent two hours making a leaf into a weatherproof cradle for her egg (pp. 84-85).

Lee's determination to record the insect world has been an all-consuming passion for a decade. Every moment of spare time from his regular job as an entomologist specializing in the effects of insecticides on rice and soybean plants at Taiwan's Agricultural Research Institute has been devoted to the project. Indeed, it has come to dominate his whole life, eating up his savings and straining family relationships. But slowly, patiently, he put together what one critic called "an epic film."

Who is this man who has made it his life's work to depict the insect world? On a tour of the Far East, I called on Lee at his home by the paddy fields on the outskirts of Taipei. As my taxi pulled up he was pacing up and down the narrow lane before his front gate: a short, eager man, whose shock of thick black hair and almost boyish looks belie his 55 years. He led me through a little garden and into his small frame house.

Timothy Green has traveled far and wide from his London base to report for SMITHSONIAN.

The front door opens directly into the most important room, his study. It is a neat room, with a cool, paved floor, but stacked with fishing rods (fishing being his other great love), a music stand with the Mendelssohn *Violin Concerto* open to the first page (he is an enthusiastic violinist) and, naturally, books upon books about insects. As we entered, a shy but smiling lady in a simple blue dress stepped forward. "My wife and greatest helper with my film," said Lee proudly. "I think without her it would never have been finished." They exchanged a few words in Japanese and she disappeared to make us some tea. Lee explained that they normally speak Japanese together for in their youth Taiwan was ruled by Japan, so they learned it as their first language; even today Lee speaks Chinese only with difficulty. His excellent English was self-taught from reading books and scientific journals.

With what I soon found was his customary thoroughness, Lee had stayed up late the three previous nights typing out for me his whole life story. He had grown up, this autobiography began, on his father's farm in Taiwan, and later had studied plant diseases in Japan. When he returned to a job at the Taiwan Agricultural Research Institute, he fully expected to be working on plant pathology; instead he found himself appointed to the Department of Economic Zoology. "It was full of ugly little creatures," his manuscript noted, "but by and by I developed a resistance to hairy caterpillars, repulsive army worms and the stink of various bugs. I even discovered that if diluted, the smell of the green stink bug could have the scent of French perfume." Lee's love affair with insects had begun. Soon he was reminding fellow scientists that "[French entomologist Jean Henri] Fabre said those who are content with looking at pinned-down insects in their specimen boxes are no more than middle-school students. We must study insects as living creatures."

A male sciomyzid fly exudes a white froth "wedding cake" which attracts female behind him on stem.

His new passion for insects could now be married to a lifelong interest in photography. He had been given his first camera at the age of eight, and started processing and printing his own pictures even then. At the Institute he began illustrating with still and motion pictures his research into the effects of insecticides on insects threatening rice and soybean crops. Chemical companies to whom he showed his pictures were fascinated and one soon paid him for a short documentary on rice insects. Afterward he said jokingly to his assistant, "Why don't we make a nature film, like Walt Disney's *The Living Desert*?" What started as a joke soon became an obsessive idea. "I determined to put on film for all the people of the world the marvels of insect life," he said. "I had no idea then what a hard, nerve-crushing task it would be."

From the outset his concept was to show the whole range of insect life: feeding, self-defense, romance (as he likes to call mating) and parental care.

He began with the varied ways in which insects feed. "Crickets and caterpillars," he explained, "have chew-

As cake nears completion, the female moves closer, ready to eat. The male has other ideas.

Female starts to eat cake, which she will do throughout, while male prepares to move into mating position.

ing mouthparts to eat plant tissues, while others, like the stink bug, have piercing and sucking mouthparts to drink plant juices. The first insect I ever photographed successfully was a hover fly settling on a radish flower to soak up the nectar with its sponging mouthparts. Butterflies have another method: they use a coiled, siphoning mouthpart to pick up liquids."

Many insects, of course, are carnivorous and are adept hunters. The mantid, for instance, tucks itself away in crevices or behind stones waiting for an unwary cricket or caterpillar to come by. The tiger beetle, on the other hand, is an open marauder. "It is one of the fiercest of flesh eaters," said Lee. Even the larvae of this beetle show great cunning. They live in a small pit in the ground, from which they strike out to snare any ant, worm or caterpillar straying past; they drag the victim back into the hole to eat at their leisure. Not that they are entirely indiscriminate—Lee once saw a tiger beetle larva haul a millipede into its lair, only to push it out moments later, apparently dissatisfied.

The hunter, however, must beware. Many seemingly harmless insects are well-equipped for their own self-defense, or at least can put up a good show. "Most insects take some action to defend themselves, although it is often only bluff," said Lee. A caterpillar, for example, may bristle up into a towering rage if it is threatened, and look quite fierce, although it has no actual weapons.

It is not all a bluff. Some hairy caterpillars, like the nettle caterpillar, have venomous spines. The ground beetle is an expert at chemical warfare; it can fire a short burst of repulsive gas at an assailant. The trouble is, it can do this only about once a week, so it has to be sure to direct the blast correctly each time—and then hope not to be attacked again until after the weekend. Lee had a frustrating time trying to catch the smelly broadside on film, for it lasts a split second. "If you miss the ejection you have to give the beetle nutritious things to eat for a week while it recharges," he told me. "So I had to devise some way of making it shoot just when I wanted it to. I couldn't touch it myself because it would eject before I could get my hand away. One

A female leaf-rolling weevil cuts and bends the leaf she is making into a weatherproof cocoon for egg.

night in my sleep I had a dream of the answer—electricity. I put wires inside the pot with the beetle, spread salt water on the soil to make it a better conductor, and then gave the beetle a slight shock."

For such detailed shots Lee converted an old chicken house at the bottom of his garden into a tiny makeshift studio, measuring just ten feet by eight. Here he worked, often from early morning until far into the night, trying to coax his insect actors to perform. Frequently they proved awkward. They might sit for hours without moving when they should have been snaring a passing weevil or approaching a female of the species or, out of pure cussedness, they might just fly away. There was a constant danger that they might be broiled by the studio lights which, coupled with the stifling summer heat of Taipei, often made the studio resemble a furnace. Air conditioning or even a fan was impossible because any draft in such a confined space might waft the insects away.

He did have one thing in his favor: insects have very precise biological clocks, which make possible quite accurate prediction of when some critical event will take place. Thus the butterfly caterpillar always turns into a pupa around midnight, while the trash carrier (aphid lion) regularly lays her eggs at sunset.

Such predictable timing at least helped him save precious film stock. He had no real budget, but poured his life's savings into the project. Thus every single foot of film had to be jealously guarded and exposed only at the crucial moment. There was no question of leaving his camera turning until the insect he was filming did just the right thing; he had to judge the precise 10 or 15 seconds to shoot. Nor could he afford a car, so that he had to do battle with the crowds struggling onto the buses out of Taipei on weekends, when he wanted to go into the countryside to collect insects.

His patience brought rewards. Working out in the country one day, Lee focused on a caterpillar being attacked by a wasp. This caterpillar has a hornlike gland on its thorax through which it emits a repulsive gas. At first, the wasp came in for a frontal attack, marching boldly down the stem of the plant toward the caterpillar, which promptly fired. The wasp beat a hasty retreat, like a demonstrator fleeing from police tear gas. But after a while it decided to try again; it zipped around behind the caterpillar to try a surprise attack from the rear. The caterpillar, however, sensed the approach, reversed the gland over its back and fired another foul jet. The wasp fled in search of easier prey.

Lee was equally fascinated by the variety of courtship rituals. There were the male cicadas vibrating their bellies to lure females, male crickets serenading their loved ones by scratching their wings together, and the winking spark of the firefly stabbing the night to find a lady friend (p. 87). His favorite is the male sciomyzid fly. To woo his chosen mate, this six-legged lover exudes a white froth from his mouth, which he fashions into a neat little ball. "He is really creating a wedding cake for her," said Lee. "And then when she is eating it, he jumps on her" (pp. 82-83).

All fascinating, but hard to film. When he started out, Lee did not even know if it was the male or female that secreted the cake. So he collected a lot of flies, put them in a greenhouse at the Institute, and then gathered his family with orders to sit there and watch until one fly "made a cake." After hours of waiting, one fly finally produced the white froth, and it was, as he suspected, the male. But how to get a fly to make a cake

The same cocoon cut away reveals the single egg at center. No silk thread or adhesive is used in nest.

to order before his camera? The ever-resourceful Lee popped a male into a small jar alone for a week, while he fed it milk and beef for added strength. Then he got set to film and introduced a female. The well-prepared male duly performed.

From the outset Lee realized he needed an assistant, but who could stand the strain of working endless hours to catch just the right moment's activity by a tiny bug? "My first assistant soon knocked over my equipment in a temper and quit," Lee recalled. Thereafter he relied upon his wife and children. But his single-minded sense of purpose brought him into constant conflict with them. He fired his eldest son after two filming sessions. "I am a perfectionist," he admitted. "I remember one of my sons saying to me, 'This is good enough.' But I said, 'No, we have to get the best.' " In the end, only his wife Manley continued to aid him. He now concedes, with considerable candor, that he often treated her very badly. "I used to curse her when there was some mistake, and I often had to apologize to her afterwards. She was very sad. But I tried to explain to her that I was so involved I did not even remember what I had said minutes later when the filming was over."

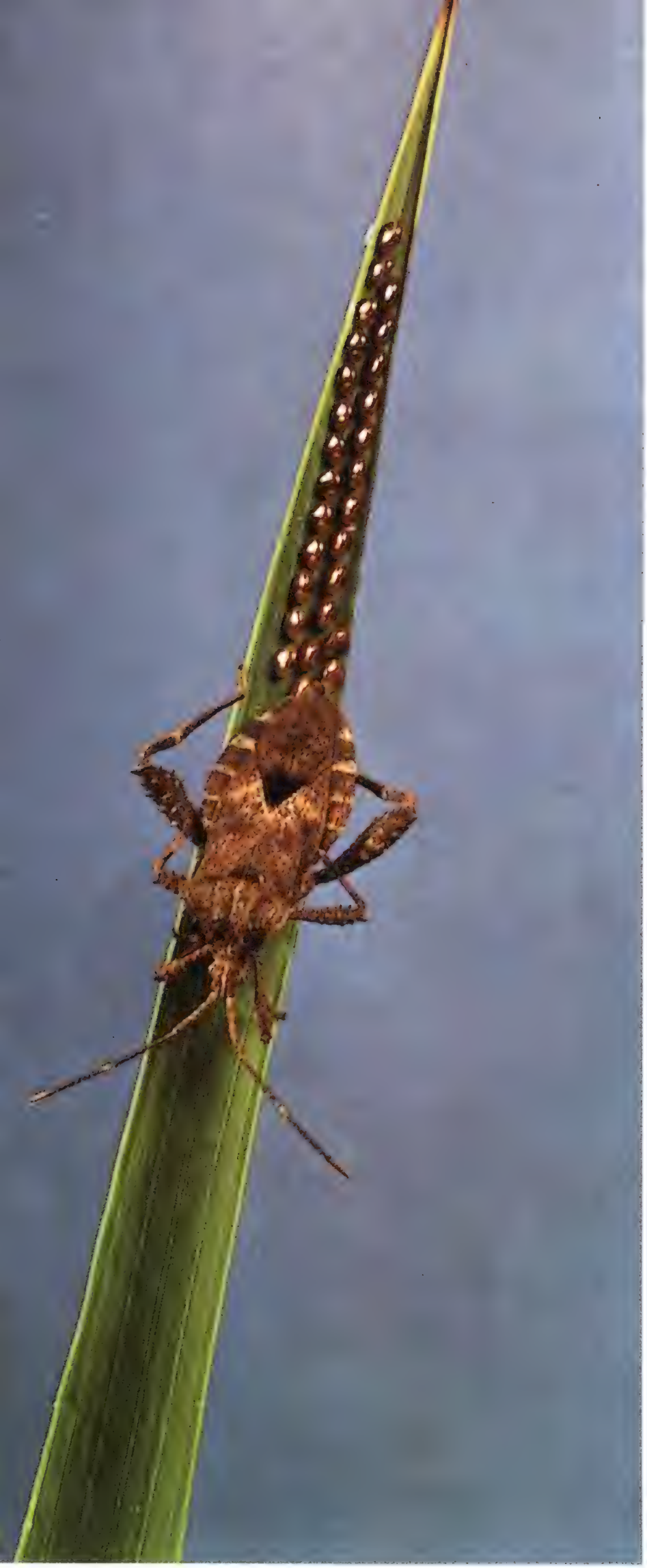
Pushing aside the friction in his own family, Dr. Lee concentrated much of his attention on insects' parental care. He observed how social insects like the bees and the wasps carefully build nests, and then feed and stand guard over their young until they are old enough to fend for themselves. "The female wasp's parental care is most elaborate," he pointed out. "She even air-conditions the nest by fanning it when the weather is hot, and any invaders, like ants, are ruthlessly driven off." He was also fascinated to see how the wasp would kill caterpillars and chew them into miniburgers for her young.

The task of recording strategic moments often required Lee to improvise his own camera equipment. When he found that available close-up lenses were not to his exact liking, he set to work to design and position his own lens that would give him greater depth of field. He assembled the finished lens on a small piece of wood, initially fixing the parts into position with Scotch tape. A photographic technician from a German camera firm who visited him shortly afterwards just would not believe that he had assembled the lens without the aid of a proper optical bench. But it worked and enabled Lee to go ahead with filming the female attelabid or cradle weevil. The weevil's technical triumph in creating out of a single leaf a perfect weatherproof cradle in which to lay an egg takes her at least two hours, and is achieved with uncanny precision (at left). First she selects a leaf, not too young, not too old, with just the right degree of stiffness. She determines this suitability with her mouth and two front legs, pushing and pulling the leaf to see how it responds to pressure. Once satisfied, she starts by cutting through the leaf at its base, so that it can be rolled up more easily later on. Then she begins conditioning the leaf by bending it; first at the tip, then at the midrib. From time to time she bores a small hole or makes notches here and there to reduce stiffness. When the leaf is suitably pliable and nicely bent, she commences rolling it up from the tip into a perfect capsule. Halfway she pauses, bores a hole into the interior and lays

A stink bug (most are plant eaters, but not this one) uses piercing and sucking mouthparts on a caterpillar.

her egg within. Then back to building, pulling and twisting the leaf into a tighter and tighter bundle until the roll stays put—and her egg is safely cocooned inside, hidden from the world.

When finished, the little beetle often starts immediately to make another. The individual Lee filmed obligingly kept making cradles continuously for three days, quite undisturbed by his studio lights. As long as she kept at it, so did he. Finally, when she had finished, Lee was so completely worn out that he barely



A female coreid bug lays brilliantly pigmented, glistening golden eggs on a blade of grass.

Fifty flashes caught in a time exposure reveal the male firefly seeking a mate in the night.

had the strength to turn off his lights and lie down on the concrete studio floor to cool off.

Lee came to have a higher and higher regard for the insect world as he progressed. "Nowadays," he admitted, "I never kill anything, even if I find an ant in the sugar for my coffee."

But there is a curious contradiction between his serious scientific work on insecticides and his devotion to the insects in his film. I asked him how he resolved it. "The conflict is there," he conceded, "I can't avoid it. But my basic desire is to help people, with better food and better health, and for that some insects have to be sacrificed. But they should not be sacrificed without good reason."

As for his own pictorial record of the insect world, Lee had a very clear, highly personal motive for making it. "In our country," he explained, "we have a saying that tigers leave their skins when they die. This film is my skin, so that I can leave something in this world when I die."

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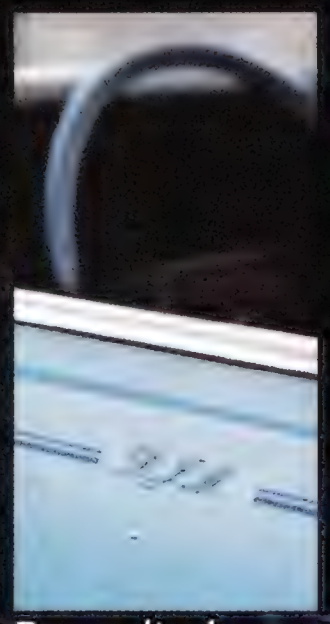

Personalized initials on door

Sports instrumentation cluster and leather-wrapped luxury steering wheel both with Ebony woodtone applique

By Constance Brown

But it's always hot-spring time in the Rockies

Regular visitors Emma and Mike Merkle soak blissfully in Glenwood's therapy pool.

Mix steaming water with falling snowflakes and you'll produce large portions of fun. This happens all through the volcanic West

Thick snow fell straight down onto the steaming surface of the Glenwood Hot Springs pool, near Aspen, Colorado. As the flakes hit, steam rose, limiting visibility to a few yards. The floodlights were muted to a soft yellow.

The fog obscured the deep end of the 405-foot-long pool and the three-story lodge beside it. The fog also obliterated hundreds of people, submerged from the neck down in the 104-degree water. Only their voices betrayed them—the voices of people having fun.

To the uninitiated, hot springs may evoke an image of murky, smelly watering holes for decrepit hypochondriacs. Wrong. Certainly the sick and old frequent these spas, but so do a growing number of healthy young people, singly or with families. In the Rockies, hot springs may not be so famous as those in the East, but they are far more numerous.

At Glenwood, enthusiastic guests come to swim in the large pool, soak in the small therapy pool and make friends. A health club is being built where the hot water will provide for steam rooms, whirlpool baths and massage rooms.

One of Glenwood's "regulars" eats strands of the emerald algae that grow abundantly in the scalding water. He also wraps his toes in dried algae to treat athlete's foot. Glenwood pool manager, Gary Miller, has never seen anyone else eat algae and won't guarantee any cures except that his water "relaxes you and works as an inexpensive laxative."

Regardless, bathers don cotton robes and plastic sandals and descend a steep stairwell to nearby Vapor Cave, where the air is about 115 degrees Fahrenheit and steam condenses and runs continuously down the stone walls. "Like going back in time," said one robed visitor to the silent cavern. It was here that Ute Indians used to parboil themselves for health's sake until white settlers arrived in the 1880s.

Walter B. Devereux, who got rich in the Aspen silver boom, provided financial backing for Glenwood and its spa complex and encouraged miners to go from Aspen to find relief from lead poisoning. Remnants of a low, circular fountain are near the main spring source, and here early spa-goers "took their cocktails" of sulfurous water. It was also sold in bottles.

"Rheumatism, gout, paralysis, neuralgia, scrofula, catarrh, sore throat, ozena, syphilis (acquired or hereditary) in all of its different forms and stages, asthma, gravel, kidneys and bladder, chronic ulcers, headache, sick headache, menstruation troubles, colic from lead, tonsilary troubles, goiter, gonorrhea, muscular contractions of the limbs, bunions or piles, inflammations of the eyes, hemorrhoids or piles, ulcerations of the womb, and all womb troubles, prolapsus of the womb

Fantasy of floodlit snow and steam envelops night bathers at Glenwood Hot Springs, Colorado.

Free-lancers Brown and Chesley recently completed coverage of a 30-day kayak trip in an Alaskan sound with the National Outdoor Leadership School.

Color photographs by Paul Chesley

Bather at Lava Hot Springs, Idaho, scurries through snow to canvas-sheltered pool.

and many other diseases. . . ." So read an 1883 list of diseases "cured or benefitted" by the water at Hunter's Hot Springs near Livingston, Montana.

A brochure describes the treatment of guests who used to be deposited by the Northern Pacific railroad three times a day: "A reinforced concrete vapor bath is usually first entered in the course of the bath. It is heated by natural steam to high temperature. Next comes a plunge with a constant inflow of hot spring water with a temperature of from 103 to 110 degrees. Immediately accessible are the blanket sweat rooms, fitted with white enamel steel cots and kept scrupulously clean. Each guest on arrival is given a blanket which is labeled with his name and is frequently renewed. Next comes the spray, needle, or shower bath, as the individual case may require, after which the patient is given a thorough-going body massage by expert attendants."

Hunter's is only a memory now. A fire in 1932 destroyed the sprawling California-mission-style lodge that accommodated 300 guests. Only the swimming pool was usable and the present owners reluctantly closed it recently, but hope that someday someone will reopen it.

The decrease in passenger trains, as well as advances in medicine, pushed many other spas into decline. Some remain as nothing more than tepid swimming pools. But a surprising number are thriving. Most of the survivors are near such recreation areas as ski resorts and national forests. Many are simply bathhouses beside motels. And many of the thousand natural hot springs in the Western states still flow silently from remote mountainsides or valley floors.

By now, most of these wild springs have seen the hand of man. They have been dammed into small bathing pools where the backpacker, surrounded by solitude and scenery, can happily skinny-dip. But the springs that flow close to highways are often as jammed with bathers as any public pool and are frequently scarred with litter.

At undeveloped spring near Aspen, snow slopes
come to an abrupt end where hot water gushes.

Travelers, detouring from Interstate 70,
soak in hot springs in South Canyon, Colorado.

Riding the "Screamin' Mimi," a bather at
Thermopolis, Wyoming, toboggans into hot water.

Rocky Mountain hot springs

Steam rises at the ghost spa of Hunter's Hot Springs, Montana. Canals that once fed its

Nomadic Indians stopped at hot springs regularly for refreshment, healing and spiritual rejuvenation. Many were considered sacred ground, and, like other areas having natural resources, were neutral territories where tribal antagonisms did not intrude. Ojo Caliente, near Taos, New Mexico, may be the oldest "developed" spa in the country—used by Pueblo Indians long before the Spaniards arrived.

Explorer Zebulon Pike visited Ojo Caliente in March 1807, while under arrest. He had ventured into the then Mexican territory, and the governor in Santa Fe was trying to find out what he was up to. Pike apparently didn't bathe in the springs, but he made note of them in his journal: "The greatest natural curiosity is the warm springs. . . . They appeared to be impregnated with copper and were more than 33° above blood heat." There are still five springs flowing from the base of a mesa, each with a different dominant mineral content: arsenic, iron, lithia, sodium and soda.

Signs in the parking lot at the heavily used Spence Springs in the Sante Fe National Forest enumerate the days when nude bathing is prohibited—"Thursday, Friday and Saturday of each week." A penalty of "not more than $500 nor more than six months in prison, or both," may be imposed on violators. The springs flow from a steep boulder field, and people drape themselves over rocks like lizards basking in the sun.

The federal government purchased the springs at Thermopolis, Wyoming, with 100,000 square miles of land, from the Shoshone and Arapaho tribes for $60,000 in cash, cattle and rations in the 1890s. Hunting in the area was no longer good, and since the Indians used a spring near the reservation headquarters at present-day Fort Washakie (named for the chief who signed the treaty), they felt no need for another.

Fred Winchester, who started the first newspaper in the Thermopolis area in 1894, was interviewed for the local paper in the 1930s. He remembered that holes were dug in the travertine foundation below the spring source, and water was channeled into them. Tents pitched over the pools provided privacy. "Back in those days," Winchester reminisced, "people used to come from all over in wagons and camp at the springs. Poverty Flats was a tent settlement below the terraces. There were others—Smokey Row, Prostitute's Retreat, Indian Camp."

Like New Yorkers who never ascend the Empire State building, Thermopolis residents seldom use the various hot springs concessions in the square mile that is now Hot Springs State Park. But people still come from all over the country, now in trailers and recreational vehicles. The Plaza Hotel, completed in 1919, is the last of the old hotels. Next door stands the new Holiday Inn of The Waters.

Down the street from the Plaza, the State Bathhouse provides more than 37,000 free baths each year. People

pools now go nowhere. The 300-guest hotel was destroyed by a fire in 1932.

This gazebo at Hunter's sheltered the fountain where health seekers drank mineral water.

from all over the United States, Canada, Western Europe and Japan sign the register. A white-tiled pool separates men's and women's tub rooms. People sit on the steps of the 100-to-105-degree pool, half submerged, looking like Roman senators discussing politics in the Forum.

Farther along, the Star Plunge is possibly the quintessential contemporary hot springs spa. The bathhouse is nestled on the back side of a butte where the primary Thermopolis spring discharges an average of three-and-one-half million gallons a day. A small circular steam room is hewn into the rock bluff, and its central fountain overflows with scalding 132-degree spring water, channeled directly from the bluff. Bathers sit on cement benches, breathing steam until they can't stand the heat anymore. Then they draw aside a plastic curtain and return to the indoor pool, where they jump in to cool down.

Hot water gushes into the deep end, and steam rises at night to enshroud the swimmers. Plexiglas skylights

Hunter's gazebo, obviously past its prime, still stands, tipping monument to past elegance.

illuminate the chamber in daytime, and rays of sunlight highlight thousands of tiny mineral particles suspended in the water. They have formed a smooth coating on the sides and bottom of the pool. A 110-degree therapy pool is elevated next to the indoor pool, and there is also a conventional swimming pool outside. On the other side of the bathhouse, a water toboggan ride, the "Screamin' Mimi," provides cheap thrills for 20 cents.

Lava Hot Springs, managed as a self-supporting state agency south of Pocatello, Idaho, is sulfur-free, but otherwise so mineral-laden that bathers float with little effort. At its "Hot Pool" 30 springs rise directly through the gravel bottom of two cement pools. Two others are equipped with whirlpool jets. They are partially covered by striped canvas awnings.

In contrast to the foundation's noisy "Olympic" swimming complex at the other end of town, these pools and their bathhouses are maintained as a quiet refuge. People recline in the dim light on immersed cement benches, steps and ramps. Some push slowly through the waist-deep water, massaging their feet on the gravel. Teen-agers, segregated by sex, perch along opposite sides of the main pool, giggling quietly and eyeing each other. The atmosphere is so relaxing that an Episcopal minister from Sioux City reportedly wrote a year's worth of sermons while staying at the Home Hotel and soaking in these pools.

In central Idaho, the springs at Robinson Bar Guest Ranch on a tributary to the Salmon River, have always been one of its unique features, and even were used when the lodge was a stagecoach stop in the late 1880s. The 120-acre dude ranch was founded in the early part of this century by the late Chase Clark, who served as mayor of Idaho Falls, governor, then as a federal judge. His daughter Bethine is married to Senator Frank Church.

The present owners, Bruce and Pat LeFavour, serve excellent French provincial cuisine and try to grow most of their vegetables. They've built a greenhouse full of watercress over one small spring. It irrigates, as well as heating the air in the structure. They submerge bottles of homemade yogurt overnight to culture in a wooden-paneled pool. Last year the LeFavours discovered one thing they can't do with the water—wash dishes. When their automatic machine malfunctioned, they hauled in water from the springs, but it tarnished the silverware so badly that it took a lot of polishing to remove the black stains.

The hot spring at Clarendon, Idaho, near Sun Valley, has been in commercial use since the silver rush of the 1880s. It will soon become a small bath concession in the middle of an environmentally balanced 320-acre residential subdivision. The developers plan to tap the available source of alternative energy generation, and they're hoping the spring can be used to heat 80 to 95 town houses that will be built near it.

In Colorado, the small Wiesbaden Motel and Health Spa in Ouray utilizes a spring in an excavated cave underneath it for baths, and heating the buildings. The spring at Dunton, near Telluride, has drawn a dozen young investors to the once-abandoned mining town of about 20 buildings. They have made the town into a "low-key" year-round guest ranch which provides cross-country skiing in the winter. The spring is housed in a barnlike structure where bathers look out low-cut windows to a lush meadow backed by 14,000-foot Mt. Wilson.

Hot springs dot the Western states like seeds in a watermelon. They are, of course, most numerous in areas which have experienced volcanic activity in recent geologic time. Almost all thermal water is meteoric water that has percolated down into the hot depths of the Earth. It then rises through fissures to the surface, dissolving and carrying minerals with it.

A summary of thermal springs in the United States and the world, originally compiled by Gerald A. Waring and prepared by the U.S. Geological Survey, catalogs 434 thermal springs in Idaho, Montana, Wyoming, Colorado and New Mexico alone. There are nearly 400 more in California, Nevada and Utah. A traveler from Cincinnati, chatting at the Glenwood pool, voiced a common reaction to them: "I slow down at any town that has 'springs' after its name, look for the bathhouse and stop over for a good soak."

This traveler won't wash his hair in an outdoor bath that captures spring water near Ouray, Colorado, but his steamy mineral soak relaxes and refreshes him.

The 1978
Never before has there been

LeBaron 2-Door

A personal car inside and out.

Should you be looking for a sleek, personal car this year, make Chrysler LeBaron your choice. It's the first of a totally new class of automobiles. LeBaron 2-door comes with many personal appointments of luxury. Overhead lighting. Velour seats. And soft leather seating is available on the Medallion model. In short, LeBaron gives you the pleasures of a luxury car at a price that makes it a pleasure to own.

LeBaron 4-Door

Luxurious and affordable.

The nice thing about LeBaron is the way it satisfies your taste for luxury but still has regard for your budget. LeBaron 4-door, for example, is elegant both inside and out. The luxurious LeBaron pictured at your right is equipped with a padded vinyl roof, available wire wheel covers, plush velour seats, and much more. In fact, it comes with many of the same comfort and convenience features you'd find on $12,000 sedans. But LeBaron can be yours for many thousands of dollars less.

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Chryslers.
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The ultimate personal car.

Cordoba has been the choice of many discerning car buyers. In fact, it's the most successful Chrysler ever introduced. And that's quite an accomplishment. But then, Cordoba is quite an automobile. This year's Cordoba is newly styled to make it the ultimate personal luxury car. From its classic lines, to its impeccable luxury, to its affordable price, Cordoba has the utmost consideration for quality.

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There are those of us who demand full-size comfort. Then, there are those of us who demand value. Somehow, Newport has managed to combine both. For 1978, Newport offers you standard comfort features like power steering and brakes, steel-belted radials, automatic transmission, rich foam cushions, even the Electronic Lean Burn engine. And the price? Well, let's put it this way. Newport is our most affordable full-size Chrysler.

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Traditionally, New Yorker's always had a knack for bringing pleasure to even the most fastidious car owner. This year's New Yorker may be the finest yet. It literally surrounds you in comfort. And the most surprising comfort feature of all, is New Yorker's very reasonable price.

But whatever type of luxury you want to Buy or Lease for 1978, the choice is up to you. At your Chrysler-Plymouth Dealer.

CHRYSLER

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By John Gribbin

Concept opening way to a scientific world of fantasy

A reverse image of the 'familiar' black hole is the white hole, where things that have disappeared from our universe turn up again

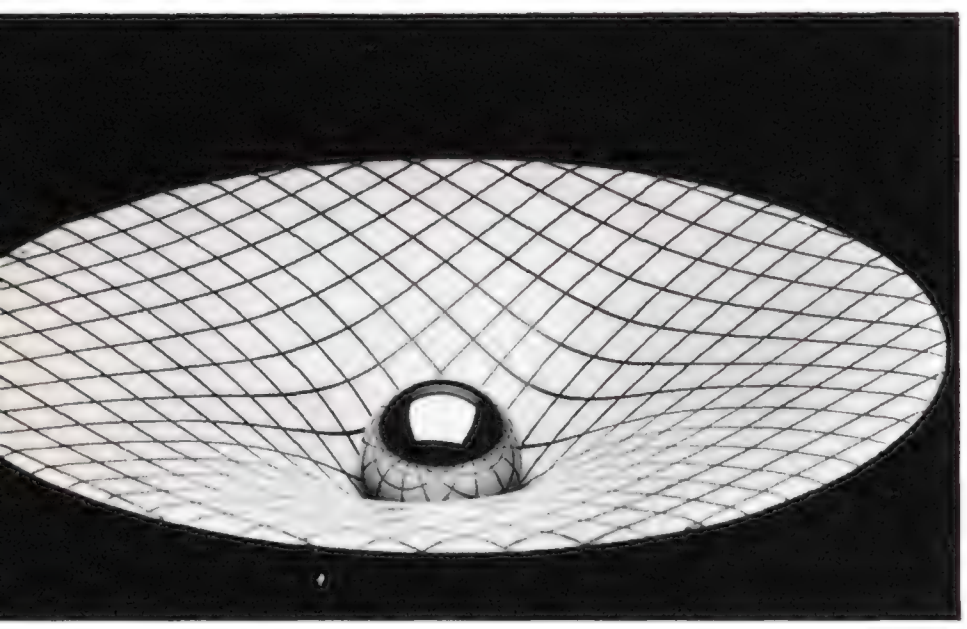
For some time now, scientists have been following rabbits down black holes, those pinholes in space and time left by collapsing superstars whose pull of gravity is so strong that nothing, not even light, can escape. But, like Alice on her arrival in Wonderland, they have yet to find a way through the tiny door at the bottom to the garden beyond. They see no way to emerge from the adventure through that astronomical chimera, a white hole.

Black holes, these days, are positively respectable. Theories about their nature have been fine-tuned, and astronomers believe they have detected at least one: an x-ray source in the northern sky known as Cygnus X-1. But white holes, those hypothetical points in space that nothing ever went into but from which energy and matter spew out, are still in the realm of speculation, as are the "wormholes" or cosmic subways that connect the two. Many a theorist, including Einstein, has toyed with the idea of matter and energy disappearing from one part of our universe through a black hole, only to reappear elsewhere through a white hole. Today the idea is in some disrepute because seemingly unsolvable objections have been raised.

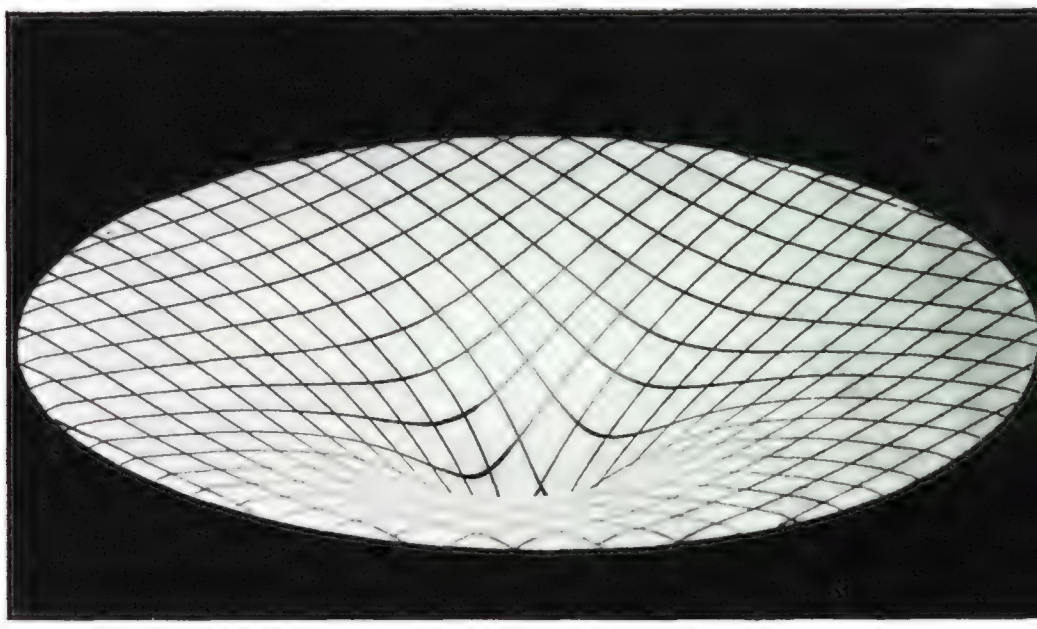
The concept of white holes has not been entirely abandoned, however. Astrophysicists and mathematicians on several continents have been caught up in the question of what lies beyond the black hole. They argue that our understanding of white holes today is comparable to what we knew of black holes 10 or 20 years ago, and that the subject needs a lot more work. The last chapter has yet to be written.

The idea of white holes is so fascinating, with its implications of instantaneous travel through space and time, that it deserves reporting as one of the more remarkable leaps of Man's mind, even if we never find the real ones. As a vision of the unseeable and the unknowable, it is a phenomenon in its own right. Even if the naysayers turn out to be right, thinking about white holes is good scientific fun—and gives us an insight into the dreams of scientists, the same kinds of dreams that produce great music and art.

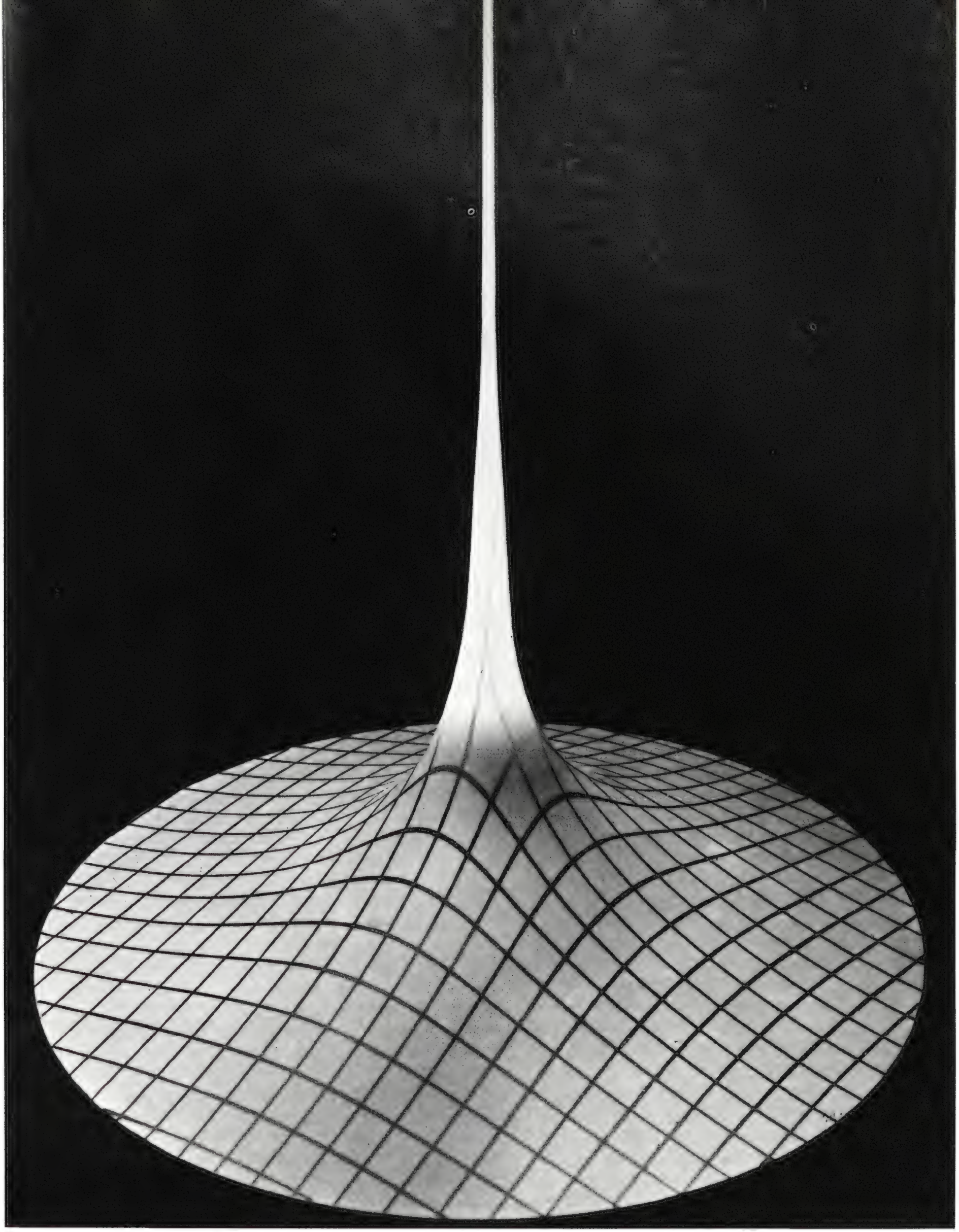
White holes and space tunnels have been part of our culture for half a century or more. Science-fiction writers have long invoked such devices, using names like space warps and hyperspace, for their heroes to bounce around the galaxy at will. Cosmic subways subvert the equations that prove nothing can go faster



Gravitational field of a large object (star) distorts space around it, represented here by the grid.



If the object is dense enough (a black hole), it distorts space so much that it disappears completely.



A hypothetical white hole in space viewed from the "other side." Here matter distorts the space around it as it enters the visible universe. Some astronomers feel that matter lost in black holes may reappear here.

Illustrations by Michael Freeman

This sphere (12.5 mm) is the size our Earth would be if it were compressed to black-hole density.

than light, and thus a trip across the galaxy must take 100,000 years. Whole flotillas of spaceships have left our universe by diving into hyperspace only to reappear instantly at their destination many megaparsecs away. For generations of readers, the scene is almost as familiar as the grim-jawed marshal facing the black-hatted desperado.

White holes do appear outside the pages of fantasy magazines, but in an equally ethereal way: they show up in the same equations that tell us what we know about the apparently real black holes. Theorists ignore them because, as far as they can see, white holes could not survive in the universe we happen to inhabit.

The problem with white holes, if in fact they do exist, is that they are "inordinately shy." It seems that a white hole would be rather quickly hidden from view by a black hole of its own creation. A spaceship emerging from the white hole would immediately find itself in a black hole and once again would disappear from the universe. Alice could never wake up.

These, at least, are the calculations of Douglas M. Eardley of Yale University and Ya. B. Zel'dovich and Igor D. Novikov of the Institute of Cosmic Research in Moscow. Charles W. Misner of the University of Maryland is equally pessimistic:

"Black holes can be formed and then stay forever; white holes—by definition—have been forever and then dissolve away. Thus even a supergalactic civilization that is able to grow stars to order could not construct a white hole. If there are any white holes, they must be free gifts of the Creator, part of the initial condition of the universe, which is barely visible to modern man and certainly not yet under his intellectual control."

Gribbin's doctoral research at Cambridge was on the gravitational collapse of stars. He wrote
White Holes: Cosmic Gushers in the Universe.

But if white holes are the stuff of fantasy, then black holes ought to be, too. What we call a black hole is a sphere several miles across; anything that goes into it never comes out. But the sphere is really the sphere of influence, the horizon, of a single, dimensionless point in space called a singularity. And it is into this point that matter and energy disappear. The large black holes postulated at the center of galaxies, including perhaps ours, manage to swallow and compress whole stars into a point smaller than the period at the end of this sentence. Curiouser and curiouser, indeed.

But what really goes on inside? Do black holes simply sit in space, gulping down whatever comes by like so many cosmic frogs, growing ever more massive? That's the conventional view today, but some cosmologists have raised the question of what might lie beyond the black hole. Is it possible that "what goes in must come out," and that black holes are really the entrances to the cosmic subways our fictional starship captains have traversed for so long?

As long ago as 1935 Albert Einstein and a colleague, Nathan Rosen, now at the Technion in Haifa, published a paper in which they discussed "bridges," interconnections of our universe by timeless passage. As recently as two years ago, J. V. Narlikar, the Indian astrophysicist, said that studies of what might lie beyond the black hole—the white hole—were in a state "somewhat similar" to those of black holes ten years earlier. Writing with a colleague, K. M. V. Apparao, now at the Massachusetts Institute of Technology, he said: "We feel that the evidence of exploding objects in the universe (including perhaps the universe itself

If the Earth shrinks to ball-bearing size, then a star makes a black hole only several miles across.

if it started with a Big Bang) indicates the necessity of studying white holes . . . in spite of any possible stability problem seen at present."

The universe is a pretty violent place, which presents a bit of a paradox. All our experience of gravity is as an attractive force, pulling things down and holding them together, culminating in that ultimate attractor, the black hole. But the most interesting objects we see in the universe are all expanding, even exploding, in outbursts of matter, radiation and energy. Whole galaxies are visibly exploding and radio sources, including the enigmatic quasars, are best explained in terms of expansion, not collapse. Indeed, the universe itself is thought to be expanding with clusters of galaxies getting farther from one another. It looks very much as if the whole universe must have originated in some great cosmic explosion, the so-called Big Bang, in a fashion that sounds remarkably like the description of a white hole.

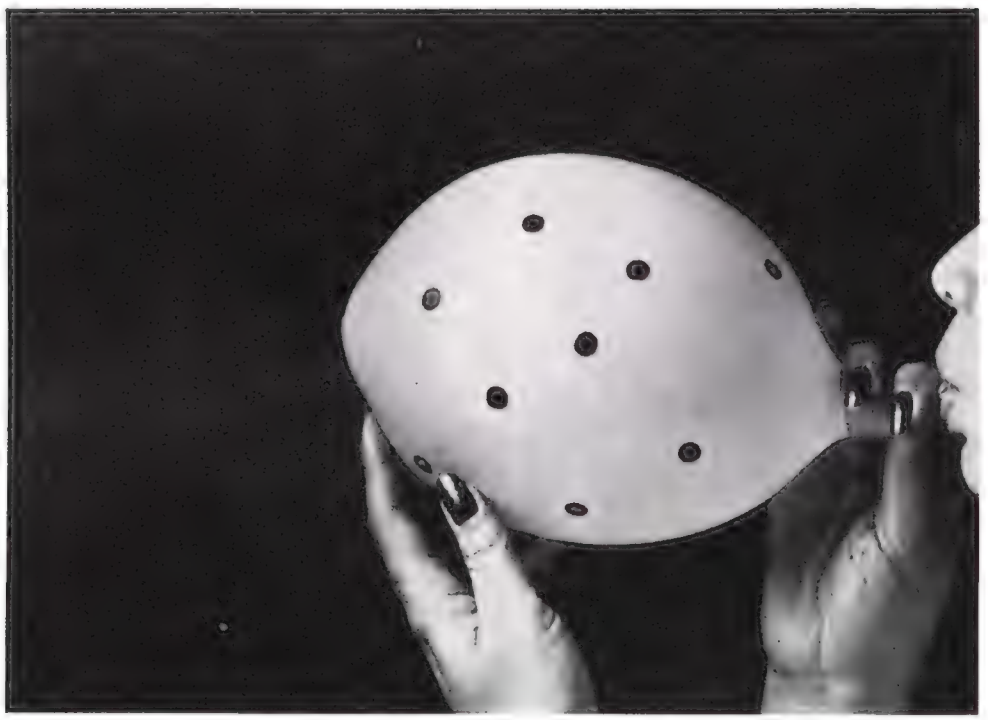
In some cases, true, gravity is triggering the violence, as in the collapse of a star until it explodes as a supernova, or when x rays are emitted by matter spiraling into that black hole in Cygnus. But it is the preponderance of objects expanding blissfully away as if gravity did not exist that invites serious study of what lies beyond the black hole. Up to a point, we can explain what happens to matter inside a black hole. If enough matter is squeezed together in one place (just how much is "enough" isn't quite clear, but it is a quantity expressed in multiples of the mass of our sun), nothing can stop the matter from collapsing indefinitely. The irresistible force of gravity must literally crush out of existence the molecules, atoms, electrons, protons and other particles of which matter is composed, squeezing everything down into a mathematical point, or singularity, where space, time and the laws of physics cease to exist.

Ever since astronomers realized that this was what the theory predicts, there has been a widespread feeling of frustration that, by definition, such a singularity could probably never be seen, since it could only occur inside a black hole, and no light could ever escape to be monitored in our telescopes.

Recently we have seen efforts to get around this in two ways. First, the theories have been refined to take into account the effects of rotation, and it turns out that in certain circumstances rotating singularities do not become entirely invisible, but keep a window open on the outside universe. This might make them visible, but it also raises other curious possibilities, of which more later. Secondly, however, some theorists have made a major step forward by asking: what does it really mean to say that matter is squeezed out of existence at a singularity? In exploding galaxies and the like, matter appears to be in a very dense state and conceivably could be being squeezed *into* the visible universe. In the last decade several astronomers (including W. Büdich at the University of Göttingen, Robert Hjellming of the U.S. National Radio Astronomy Observatory; and Narlikar and Apparao) have had the same idea. These exploding sources, they said, might mark the sites of singularities where matter really is pouring out from a point source, perhaps even a point singularity connected, in some mysterious way, with a black hole which is busily swallowing up matter somewhere else.

The only way to go: through hyperspace

This is where the cosmic subway or "space-time gateway" comes in—a concept even more speculative than white holes. For matter to get into a black hole and then out of a white hole without crossing the visible space in between would be no mean trick, and would have to mean that in some way it had "tunneled" through the intervening space. In effect, the matter would take a shortcut, a subway, if you will, through some higher dimension or dimensions: a hyperspace. Science-fiction readers will recognize here an old, familiar term. Those writers who have taken the trouble over the years to think about such things have always sought to explain space travel at velocities faster than the speed of light by invoking just this kind of cosmic shortcut. Isaac Asimov's classic Foundation Series, or Trilogy, which had its origin in the course of a subway ride taken by the author in 1941, is no exception: "He had steeled himself just a little for the Jump through



The classic way to explain the expansion of the universe is to consider dots on a balloon.

hyper-space, a phenomenon one did not experience in simple interplanetary trips. The Jump remained, and would probably remain forever, the only practical method of traveling between the stars. Travel through ordinary space could proceed at no more than [the speed] of ordinary light . . . and that would have meant years of travel between even the nearest of inhabited systems. Through hyper-space, that unimaginable region that was neither space nor time, matter nor energy, something nor nothing, one could traverse the length of the Galaxy in the interval between two neighboring instants of time."

In essence, Asimov's spaceship digs itself a black hole, crawls in and pops out somewhere else. The major snag, though, is that the only way we know of to make a black hole today is by putting the mass of three suns together, and this would make for a rather impracticable, hefty spaceship!

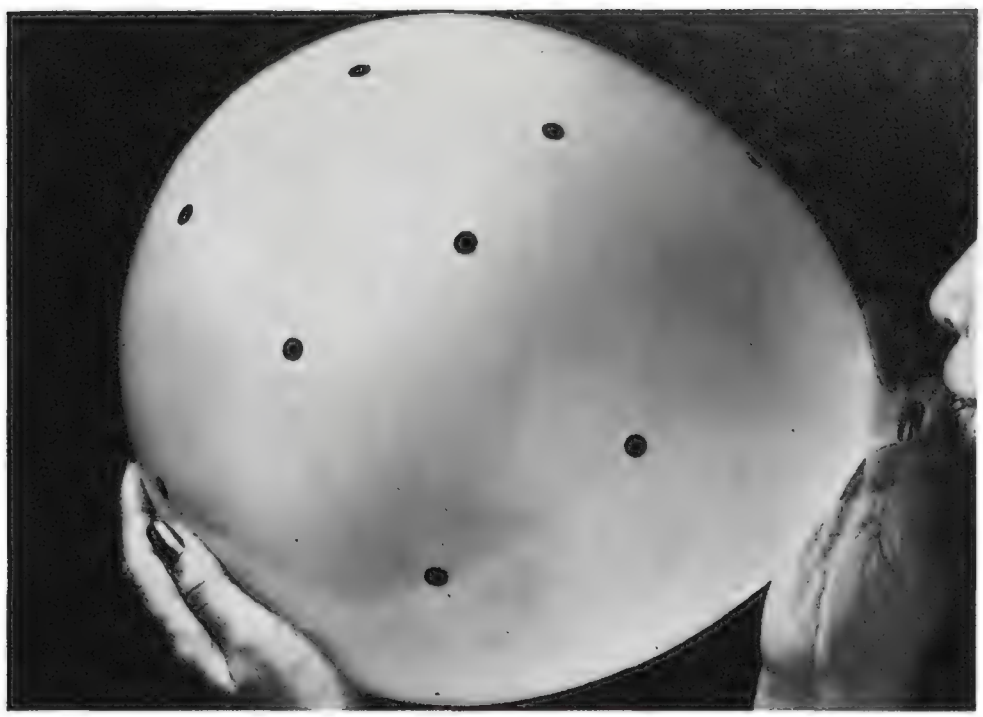
Adrian Berry, a British science journalist, has proposed instead that the inhabitants of the solar system build a permanent entrance to the cosmic subway by constructing a black hole outside the orbit of Pluto, the farthest known planet in our solar system. Better, perhaps, to find a natural hole in space and dive right in. It might be difficult to decide "where" and "when" (let alone "how" or even "whether") to emerge again, because hyperspace really could be both timeless and spaceless, a region where "before" and "after" could be as meaningless as "above" and "below," "forward" or "backward." The best solution of all, in theory, would be to find a natural black hole already connected, through the cosmic subway, to a white hole somewhere else, and to use it in much the same way as we would a normal subway. But even this has its problematical aspect.

The problem, referred to earlier, is stability. John A. Wheeler, Professsor of Physics at the University of Texas, says that even if there were such a "cosmic subway" connection, it has been recognized that any bridge between two universes—*i.e.*, the Einstein-Rosen bridge—or a wormhole connecting two different points in the same universe, would "pinch, melt, squeeze, slough off—or disconnect—in a fantastically short time." Others have calculated the lifetime of a wormhole at 1/10,000 of a second.

Alan P. Lightman of Harvard University and the Smithsonian Astrophysical Observatory compares the stability of this system or structure to sharpened pencils. Well-sharpened pencils are never found standing on their points, he says, because even though in theory they could precisely balance the forces acting on them, in actuality they come tumbling down under the slightest external perturbation.

Even before worrying about whether the tunnel will collapse, a space traveler would have to survive the sheer feat of entering the subway through a black hole. It may be that a collapsing object shaped like a football would be crushed into a long, thin, threadlike singularity, not a mathematical point. And this kind of rotating "hole" could be, as far as we know, free to interact with the outside universe, unlike a simple black hole. It's as though the thread would provide a route for communication between the "inside" of a black hole and the outside universe.

According to John G. Taylor, Professor of Mathematics at the University of London, rotating black holes can form a ring of singularity that could, in principle, be avoided by an expert navigator. Once past the ring, the spaceship would emerge not next door to the singularity in the space it had just left, but in new



As the balloon is blown up, each dot (representing a galaxy) gets farther from every other dot.

No dot (or galaxy) is really the center with all the others moving away; all the dots are in motion.

regions of space—and time. The intrepid traveler would emerge in a different part of the universe, at a different time—and perhaps in a completely *different* universe, where the laws of physics themselves might be different from those we know and love. Even the journey would be a very strange experience, with time not necessarily flowing in the everyday sense. As Taylor puts it, "the psychological problems would be as great as the gravitational ones" and "it may not be a world you [would] want to live in."

Other theorists, however, have trouble with the whole idea. They argue that the invocation of rotating black holes requires a special mathematical technique rather than the plausible laws of physics to work. Moreover, Kip S. Thorne of the California Institute of Technology and James M. Bardeen of the University of Washington have calculated that black holes in realistic environments could not spin fast enough to create space-time gateways, anyway.

As yet, clearly, black holes and space-time tunnels are of no use for cosmic travel so far as we are concerned. But these bizarre ideas do offer new and perhaps better ways of understanding the violently active phenomena that characterize the universe in which we live. The most fundamental feature of the evolution of our universe is that it is expanding, and the problem of understanding this expansion is the most basic problem in astronomy.

Most cosmologists today have very little doubt that this expansion probably started with the initial Big Bang, blasting outwards from a singularity of just the same kind as has already been discussed here.

The standard way of explaining this universal expansion is to draw the analogy with a rubber balloon that is being inflated (opposite and above). If we imagine spots of paint marked on the surface of the balloon, it is easy to see that all the spots get farther apart from one another as the balloon expands, although no one spot can be picked out as the "center" of the expansion. The balloon's surface is two-dimensional, of course, wrapped around in a third dimension. The universe we live in is three-dimensional, and the analogy would be complete if it were wrapped around in a fourth dimension to make some kind of hyper-balloon. The present state of the observational art cannot tell us how accurate this analogy might be. But with the current speculation about black and white holes, and tunnels through space-time, it is at least possible now to make some educated guesses.

Suppose our balloon also had paint spots, corresponding to the galaxies in our expanding universe, on the inside of its skin. Extending the analogy in this way is open to dispute, but if we do allow it we now find that we have two expanding universes inextricably linked by the expanding fabric of the balloon (equivalent to the fabric of space-time that forms the basis of our universe) but never in communication with one another. A black hole singularity would now correspond to a hole in the fabric of the balloon, tunneling through into the "other universe." From one side, the hole would be a black pit, swallowing matter up; from the other, it would appear as a singularity—a white hole—spewing matter out. Both universes could be continually gaining and losing matter through these space-time tunnels, so that the laws of mass and energy conservation would apply not just to

one universe but to the two taken together. And, although there is no such simple physical analogy, in mathematical terms it is possible, by invoking higher dimensions, to consider more elaborately connected systems of several universes joined by space-time tunnels. This is why our space traveler would have to be intrepid indeed to dive into such a tunnel.

The possibility still remains that both ends of the tunnel could be in our own universe; perhaps the situation (at least for some tunnels) is more akin to that of a subway with stations all in the same city than to an intercontinental subway with entrances and exits scattered at random across the globe.

One insuperable difficulty with the cosmic subway concept may be that all the exits are sealed. Many cosmologists have accepted Eardley's argument that any white holes that may have existed in our universe have long since turned into black holes. The idea is that a white hole, just like a black hole, has great mass and would therefore also attract light and all forms of matter by force of gravity. Unlike the situation at a black hole, however, any light, radiation and cosmic debris that had fallen onto the perimeter of a white hole could not get into the white hole, but would have to float forever at the surface.

(An astronaut emerging into our universe through the white hole would have to pass through this layer of "fossil light," Eardley says, and as he did so would see "the entire past history of our universe flash before his eyes." Unfortunately the astronaut would have to wear several tons of lead because the gravity would have compressed the light so radically that he would see not just "a flash of light" but "a blast of extremely energetic X and gamma rays" as well.)

The accumulated radiation and matter would eventually produce enough gravity to form a new black hole surrounding the white hole. Now, in turn, that black hole might lead to another white hole . . . and so on. But, Eardley concludes, the astronaut could not emerge into our universe from any such white hole because all white holes would have turned into black holes. And, if a black hole is an entrance to the cosmic subway, "then there is no exit."

In the eyes of many astronomers today, this must be the last word, leaving white holes and cosmic subways firmly in the realm of science fiction. "But yet," we might say, looking at the universe as a whole, "it *does* expand." If white holes must be "part of the initial condition of the universe," then study of these mysterious concepts must help us to understand the greatest puzzle of all, the origin of the universe itself. The burden of proof is not yet sufficient to decide the issue either way, for *or* against the existence of white holes, and the enormous implications of the concept certainly justify further investigation. As Carl Sagan, the Cornell astronomer, once put it, "Black holes may be entrances to Wonderlands. But are there Alices or white rabbits?"

In these photographic concepts, gas, dust and solid matter (above) spiral in toward a black hole, trapped in its powerful gravitational field. The asteroid in right foreground is cracking under strain. A starship (opposite) hurtles toward black hole, now a dark ring, and the stars of another universe.

In praise of beasts: round-the-world museum observance

By Maureen Green

The idea was as simple as the distances involved were long—to observe through Man's art his relations with animals

Yale Center for British Art

Royal Scottish Museum, Edinburgh

Edinburgh A prettily pastoral sheep of dainty Meissen, dated 1740-1750, included in the Royal Scottish Museum's showing. The exhibit intersperses art objects with natural history displays of wild and domestic animals.

Yale Two museums and two libraries at Yale in New Haven are joining the observance with separate showings. This fearsome and fanciful tiger, by Elizabeth Pringle, done about 1796, is included in the exhibit at the Yale Center for British Art.

Lovers of animals and lovers of art—not always the same people—will be mingling together this fall and winter to celebrate the fruitful tradition whereby men and women have from the very earliest times drawn, carved, painted, sewn, sculpted and otherwise recorded the shapes and spirit of animal life. In some 30 museums, ranging from the Smithsonian Institution in Washington and the Natural History Museum of Los Angeles County to the British Museum in London, the Prado in Spain, Topkapi in Istanbul and the Prince of Wales Museum of Western India, Bombay, related but independent exhibitions are being mounted. Over the next six months they will display the many ways humanity has regarded animals—both wild and domestic—with fear, admiration, awe, curiosity, simple love and finally, in recent times, with concern for their survival.

Suitably, the ingenious umbrella idea, "The Animal in Art" as the international exhibits are to be called, was first suggested to museum directors by Fleur Cowles (Mrs. Tom Meyer), a trustee of the World Wildlife Fund. The project is fired by the hope that, along with enjoyment of the works of art displayed, will come awareness of how much poorer we would be if animals and the feelings they engender among people were forever lost. Immediate financial benefits to the World Wildlife Fund will come from sales of posters and souvenirs, from royalties from Lord Clark's book, *Animals and Men* (SMITHSONIAN, September 1977), published to coincide with the international exhibi-

The Prince of Wales Museum of Western India, Bombay

Bombay The Prince of Wales Museum of Western India will present 386 animals as represented in sculpture, textiles and painting, all indicative of the pervasive effects of animals on the Indian civilization from 2,500 B.C. to today, including this 18th-century miniature pachydermic ballet.

The Beinecke Rare Book and Manuscript Library, Yale University

Yale The university's Beinecke Rare Book and Manuscript Library will show this 18th-century page, the "Life History of a Cockroach on a Flowering Pineapple Plant," from book by Maria Sibylla Merian.

Museum Rietberg, Zurich

Zurich The lion is Zurich's emblem and the Museum Rietberg is building its show around it as a symbol of power. Here, a textile medallion, Coptic or Byzantine, from Egypt, circa 7th century A.D.

tions, and from concerts and many gala social events.

Getting the idea of "The Animal in Art" off the ground was, as Fleur Cowles relates, "no problem—it's so obvious, and most museum directors were willing to say, 'Why haven't we done this before?' " The only organizational difficulty was timing. For a year she prodded and made suggestions. In some cases after the merest nudge, museum officials readily found a sympathetic scheme, simple or complex.

Herbert Friedmann, of the Natural History Museum of Los Angeles County, has devised an exhibition to concentrate solely on animals in the wild, as depicted in works from prehistoric cave paintings to the present day. In London, students at the prestigious Royal College of Art were sent off at the beginning of the summer vacation to think about wildlife as a whole, animal and vegetable, and to return with a finished work in textile, jewelry, ceramics, furniture, as well as sculpture and paintings, that would supply a fresh young view of the visual delight of animals and flowers.

Author Maureen Green, wife of author Timothy Green (p. 80), wrote about Britain's new National Theatre for the June 1977 SMITHSONIAN.

The Royal Scottish Museum in Edinburgh is bringing together, for a display in January 1978, groups of antiquities, from all periods, of horses, fish, birds and wild animals, plus a special section of animal paintings culled from their annual children's art exhibition, with the intention of suggesting "what a sad place the world would be without animals," as Dr. A. S. Clarke, who organized the display, puts it.

In Washington, three divisions of the Smithsonian Institution will join the worldwide endeavor. The Hirshhorn Museum and Sculpture Garden will display more than 80 paintings, sculptures and graphics, some never publicly exhibited before. The National Museum of Natural History is mounting an exhibit of 57 color close-ups of animals taken by film producer and photographer Kjell Sandved. The National Zoological Park will give three public Sunday afternoon sketch-ins, providing drawing materials, animals and on-the-spot instructors.

Four institutions at Yale University will participate with special exhibits. Yale Center for British Art has titled its showing "The Animal Kingdom: Wildlife in British Art." It will include 50 paintings, drawings, prints and rare books. Yale's Peabody Museum of

San Diego Museum of Man

Natural History will present diverse cultural materials from such regions as Melanesia and Mesoamerica. Books and manuscripts from the Beinecke Rare Book and Manuscript Library and the Sterling Memorial Library will emphasize the interaction of the descriptive and the decorative in animal illustration and the use of animal forms in symbolism and humor.

South Africa will honor the celebration with a traveling exhibit to be shown in nine museums, municipal galleries and universities over the course of a year. Objects displayed will include tribal art, Bushmen rock paintings, Ashanti gold weights, jade and porcelain pieces, tapestries and stamps.

Istanbul's Topkapi Museum, with Ottoman miniatures from its vast collection, "will show that Turkish artists have used animal themes throughout the centuries," in the words of Director Kemal Çığ.

In Mexico City the National Museum of Anthropology will have, according to Dr. Enrique Beltran, Mexico's leading conservationist and director of the Instituto de Mexico de Recuersos Naturales Renovables, an exhibition showing "something that is quite special to us—the way animals were represented in our Prehispanic civilization."

In December, the National Museum in Lagos, Nigeria, will open "The African Animal in Art," and hopes to send the show throughout the country later.

And in a number of museums where the general theme was at first approached with caution, the staffs were surprised at the range and significance of the ideas that arose. While admitting that "at first, we had a small budget and nobody treated it as a very grand affair," Jessica Rawson, curator in charge of the British Museum's exhibit, opening in December, now says, "In scale it has turned out to be one of our most ambitious exhibitions, with more than 600 objects—a third of them coins—and something from every department." Her scholarly book, *Animals in Art*, published in conjunction with the exhibition, conveys the theories and rich comparisons that came to light once the British Museum departments started dipping into their treasures.

"What particularly interested me," says Mrs. Rawson, who is Deputy Keeper of Oriental Antiquities, "was the attitude towards animals of ancient societies, and our attitudes today, as typified by the World Wild-

Los Angeles *Beauty of the Beast* is the title of show at the Natural History Museum of Los Angeles County, and outstanding in it is this prime example of the art of the Tlingit Indians of Alaska. Shaman's rattle, mid-19th century, is 13¾ inches long, combines variety of animal life in a superb art form.

British Museum, London

London Looking as up-to-date as today, these Roman marble greyhounds nevertheless date from first to second century A.D. About 25 inches in height, the sculpture is included in a section devoted to domesticated animals in the extensive British Museum show. Romans loved pet art.

life Fund. So I designed the exhibition to ask 'What are the basic ways that Man has looked at the animals and how have we got where we are today?' The exhibition will not be displayed chronologically, but under subject headings. Under 'Hunting,' for example, we are showing together the views of those who lived by hunting, Paleolithic man or modern Eskimo, and rather separately societies in which hunting had become an expedition to glorify Man, a ritual, not a search for food, surrounded by social rules as it is even today." There are sections on domestication, animal symbolism and animals in ornamentation.

An amusing tailpiece will be a display of Beatrix Potter's drawings of the Flopsy Bunnies, sure to fascinate the many children who visit the British Museum.

Nothing could be dearer to the heart of the World Wildlife Fund either. "We know we have got through already to the people who are natural conservationists and ecologists," says Fleur Cowles. "This series of exhibitions will appeal to a literary and artistic audience. It should also engage the interest of very young people. The British Museum is always full of the very young sitting on the floor sketching during the school holidays. We can enhance their interest in animals, without necessarily having to explain to them why it is so important. But if they sit drawing animals now, they'll be that much less likely to kill an animal, or allow others to do so, later on."

Washington Probably no 20th-century artist has more of the tension of the age in his work than Marino Marini, the renowned Italian sculptor whose *Horse and Rider* will be in the Smithsonian Institution's Hirshhorn Museum and Sculpture Garden exhibit. It is in the Hirshhorn collection.

Hirshhorn Museum and Sculpture Garden

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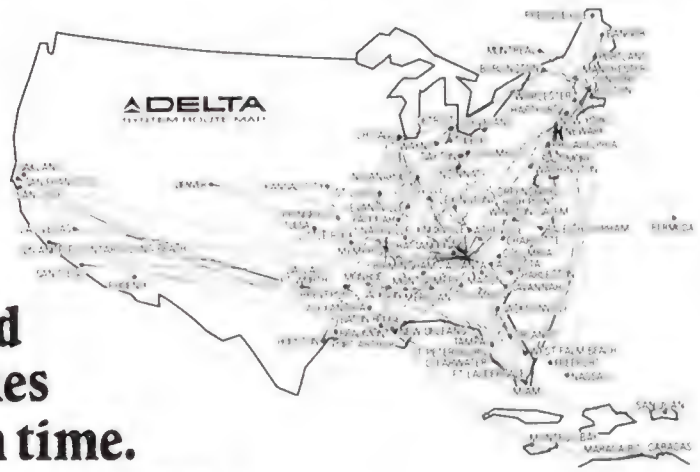
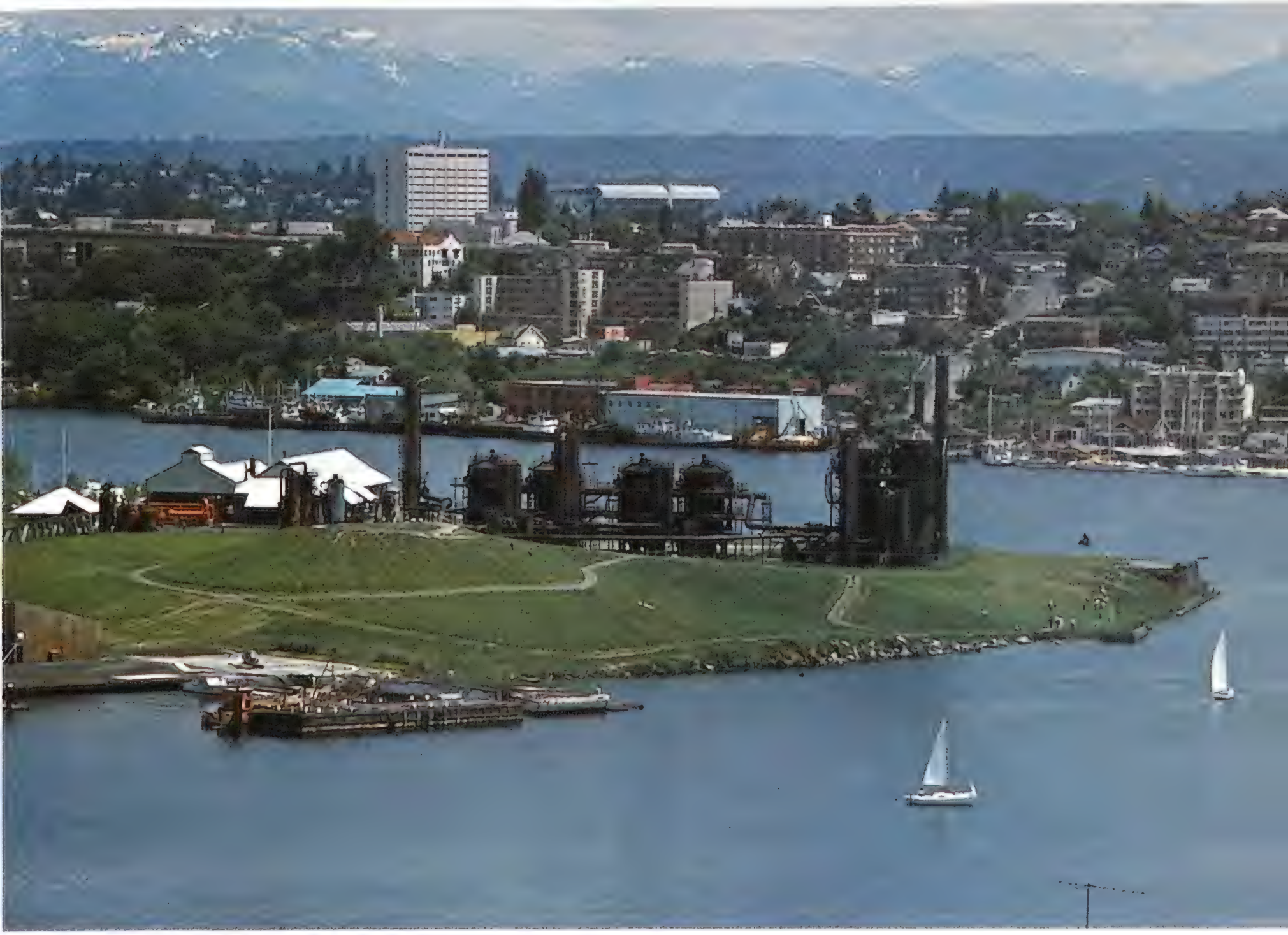


This is Delta's Wide-Ride™ L-1011 TriStar, a $25 million superjet. The "living room" cabins are 8 feet high, almost 19 feet wide.

Before: a volcano of industrial pollution, gasworks beclouds Seattle's air with coal smoke in 1932.

In brightly painted former compressor room of the gasworks, children cavort on old machinery.



After: beyond smokeless Gas Works Park, on Lake Union, are University of Washington and the Cascades.

By Grace Brynolson

Gasworks (ugh!) reborn as city park

After a first incarnation as a fire-breathing monstrosity, another as a hunk of junk, Seattle's noisome nuisance is a happy place

Why would any city with its fiscal wits about it invest $3.26 million to turn an ugly, defunct gasworks—on a windy, noisy spit of oil-poisoned land jutting 400 feet into a polluted downtown lake—into a public park? The expense and indeed the effort would seem particularly zany for Seattle, which already had 11 fine conventional parks with assorted greensward, beaches and educational amusement facilities.

Yet Seattle did recycle a historic eyesore, described as having "all the nostalgia of a well-rusted junk heap." And the 20 acres of wasteland and scrap iron are now an imaginative park the like of which cannot be seen elsewhere, created at less than the usual cost of producing urban parkland.

The onetime public nuisance is called Gas Works Park, a city playground for city people of all ages. On a typical drizzly, gusty afternoon when other Seattle parks are empty, its covered play barn, the former compressor room, is swarming with children climbing

Color photographs by Robert W. Kelley

Inside the vast play barn a girl is poised to slide down wheel of onetime gas compressor.

Musicians give outdoor concert in the park. Towers in background date from old gasworks.

on the merrily painted machinery while the great mound, a grassed-over slag heap, is crowned with kite-flying kids and parents, and the plastic-roofed former boiler room is full of families cooking and eating at ranks of hibachis.

Richard Haag, designer of the park and founder of the University of Washington's landscape architecture department, called the site an "industrial area inviting raucous activities." It is certainly not a quiet place. Small prop seaplanes swoop low overhead to land in Lake Union or take off from it. Police choppers rattle up from the helicopter pad of the Water and Air Patrol next door. Kids yell, dogs bark, parents shout and whistles toot against the constant background noise of two main highways. Occasionally all this din is drowned out by a rock-band concert or a performance by amateur musicians.

The Gas Works Park site has not been so roundly appreciated since 1906, when as Brown's Point it was a wooded spur of land, lapped on three sides by pure lake water and popular with picnickers. That year, the Seattle Lighting Company, a chief supplier of heat and light for the fast-growing frontier town, moved to Brown's Point, a strategic location for the barged delivery of coal for the production of gas. Giant machines were installed, mains were laid and the coal barges arrived in tandem. While the nightly fountains of sparks from the plant's towers were fireworks for distant viewers, the gas plant's residential neighbors, those on whom its soot fell, were soon moved to complain bitterly about dirt and odor.

By the early Thirties, there were so many reports of "smoke, fumes and odors" coming from the gas plant that Seattle's city council passed an ordinance for "abatement of a public nuisance," but the gas company promised to install new equipment. As it turned out, the new equipment was more machinery to produce more gas, for in 1937 oil replaced coal as fuel for making gas and more towers were put up. Before long, barges and oil tankers were unloading 50,000 barrels at a time at the plant.

In 1950, the city engineer accused the gas plant of being the cause of more complaints than any other place in the city, including three municipal dumps. Pet canaries reportedly died from gas-plant fumes. In 1951 Seattle, which had no air-pollution control, was told it could have two more hours of sunshine a day if it cleaned up its air. Nobody was sorry when, in 1956, nontoxic, cheaper natural gas arrived by pipeline from Colorado and New Mexico and the gas company closed down its Lake Union plant forever.

During the next two decades the abandoned gas-

Grace Brynolson, a free-lance writer and native of the Seattle area, lives near the Gas Works Park.

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works just stood there, its enormous holding tanks and black cracking towers a monument to the city's past but an affront to every eye.

The first city official to think of buying it for a park was the late Mrs. Myrtle Edwards, a dedicated lady who chaired the parks committee of the city council for 14 years. She, along with a former mayor named Dorm Braman and gas-company president William Woods, got together and negotiated the purchase. The price of $1,336,352 was for the land, cleared and leveled at the expense of the gas company.

Later landscaper Haag was hired to mastermind the transformation. To be close to his subject, he converted the reeking former blacksmith shop into a skylit office. By soil studies he proved to the city council and the parks department that the site resisted the concept of a post-Victorian greensward type of park: the earth was contaminated for 15 feet down to the water table. Officials were convinced of this when an engineer descending into a drilled hole was hauled up in a faint from the fumes. As one staff member recalls, "It was a 15-foot layer cake of oil, wastes and sand." Cleaning it up would have been too costly.

In two years, Haag came up with his master plan. "I like to recycle things," he says, and he felt that the gasworks, as part of Seattle's industrial history, had irreplaceable and significant totemic artifacts that would fascinate future generations. In the end, 20,000 cubic yards of oxides, arsenic and lampblack were gathered from the site and piled high to make the hill overlooking the lake. Some oil and tar residues were hauled away to dumps approved by the Environmental Protection Agency. Concrete footings were moved to form a base for parking lots. Some eight and a half miles of pipes were dug out to be replaced by underground trunklines for utilities.

So far, $3,261,812 has been spent on acquisition, planning, design, site preparation, painting and planting. Eventually (at a cost of another $3.5 million) there may be floating restaurants, a marine education exhibit, an expanded parking lot, a flea market, a *camera obscura* in the largest of the towers, elevators in the towers and high viewing platforms.

Meanwhile the park is working, and popular; two years ago its master plan received a design and environment citation from the federal government for "successful conversion of a gas utility station into a fascinating exhibition of obsolete industrial hardware. . . ."

As much fun as a jungle gym, pipes and wheels inside old plant are great clambering country for kids.

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By Bill Blackbeard

Novels that boys of a century ago couldn't put down

Alger's style was execrable and he was no paragon personally, but his books made a success-story myth that is immortal

"Tattered Tom," a protagonist of an 1870s series, was actually a tomboy, a girl of the big-city streets.

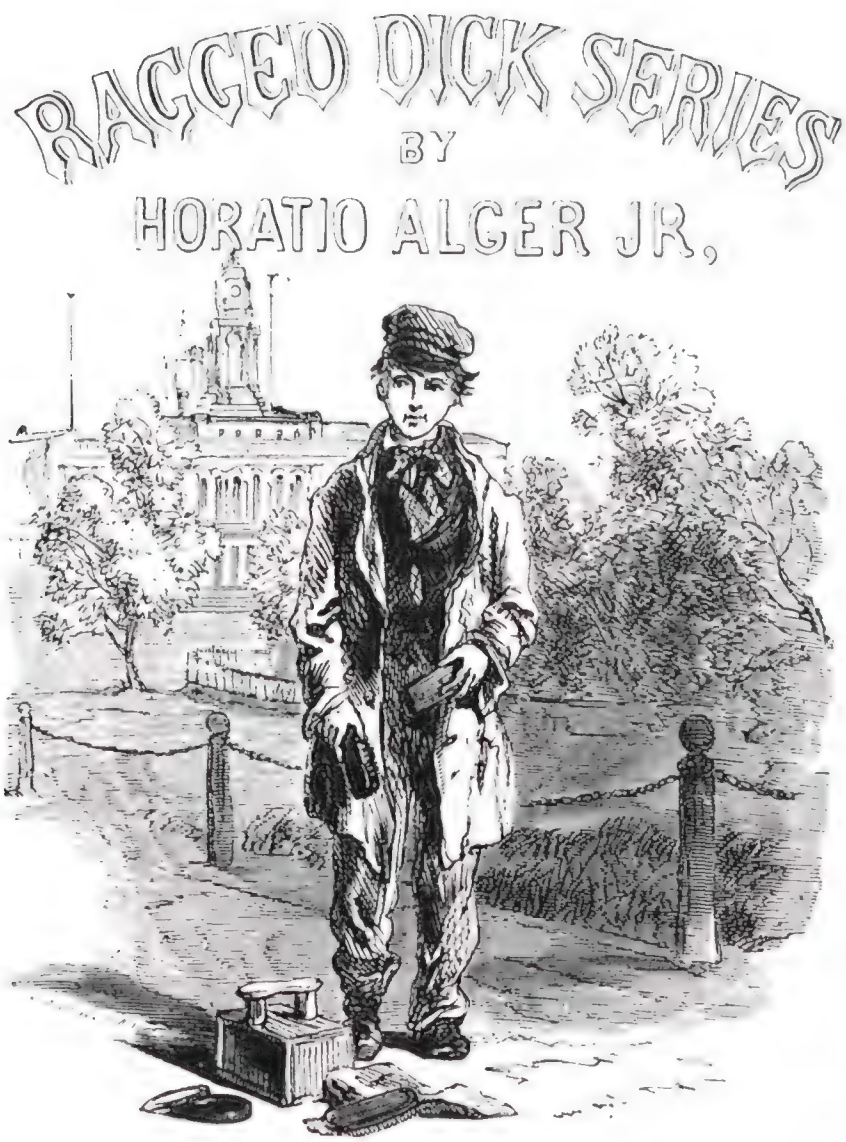
At one of the more crucial points of Horatio Alger jr.'s *Ragged Dick,* the most popular boys' novel of the 1870s, its noble but semiliterate hero is handed a book. "Dick," the author wrote, "surveyed the book with some awe. 'I aint much on writin',' he said."

Neither, if the truth be told, was Horatio Alger jr. himself, whose prose has been gently and accurately described as leaden, puerile and a Matterhorn of clichés. Take this randomly picked passage from one of Alger's most famous books, *Dan the Newsboy:*

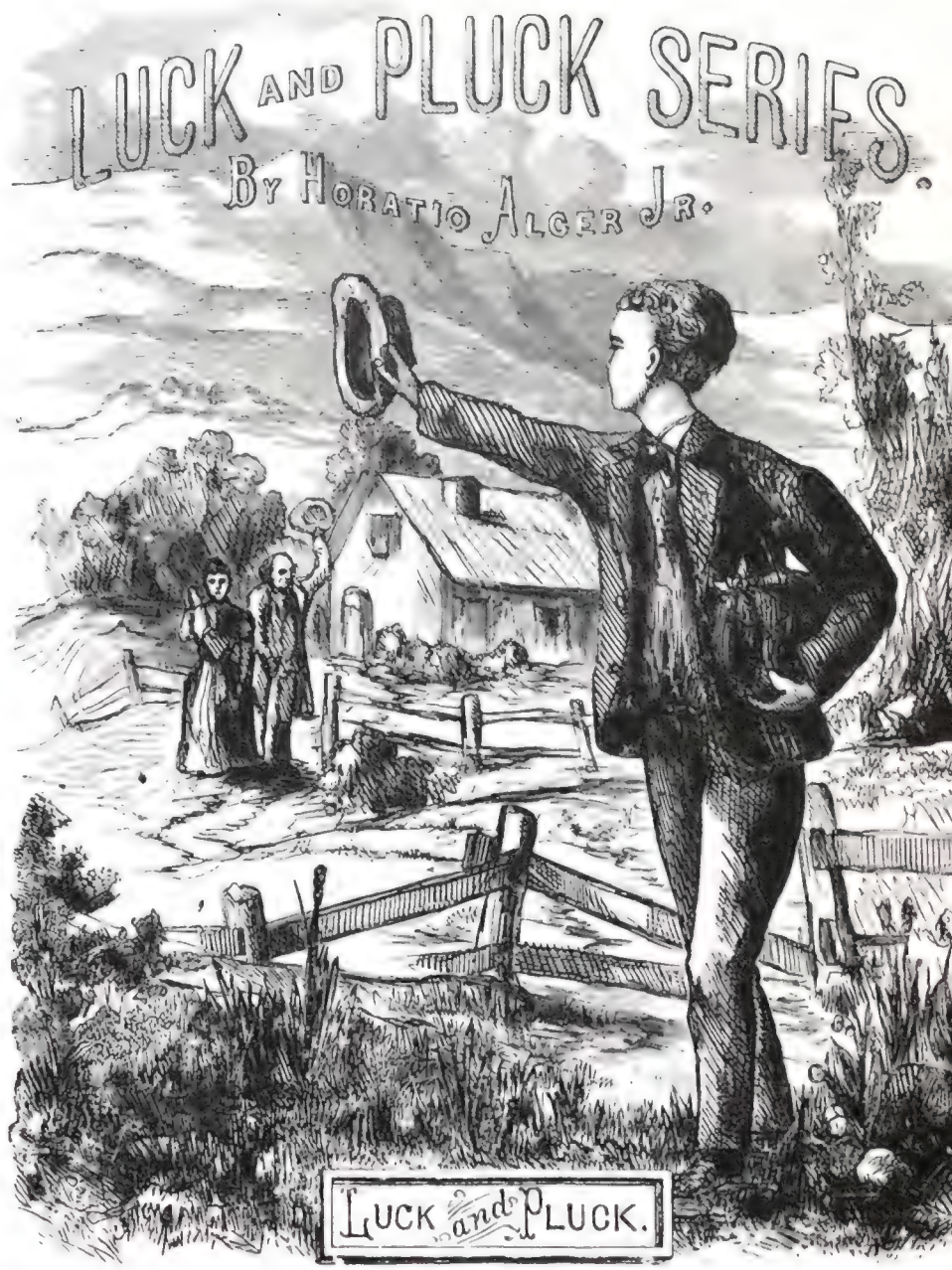
"At a second-hand store on Chatham street, [Dan] picked up a suit of tattered velvet, obtained a liquid with which to stain his skin to a dark brown, and then started out as an Italian street musician. His masquerade suit he kept in his room at East Fourth street, changing therefrom his street dress morning and evening. When in full masquerade he for the first time sang and played, Giovanni [Dan's friend] clapped his hands with delight."

Such a narrative passage would not have been set in type by any self-respecting newspaper of the time, no matter how pressing the deadline for copy. Some of it reads like a literal translation from German. Yet Alger's enormous legion of boy readers never minded in the least. In their eyes his prose was simple, fast and to the point. Clumsy syntax and grammatical topsy-turvies didn't bother them, either. And, fearful of disturbing the magic that sold Alger's books, novel after novel, into the millions of copies, his publishers hardly changed a comma in the master's manuscripts. His spelling errors were also preserved intact: through his last published novels in the early 1900s, for example, his eccentric spelling of "cop" as "copp" was scrupulously retained.

Horatio Alger jr. was one of the great literary sports that occur with sufficient frequency to drive sensitive readers of good English prose frantic. From G. W. M. Reynolds through Ned Buntline, Bertha M. Clay, Frederick Van Rensselaer Dey, Gilbert Patten and Oliver Optic to the Max Brands and Sydney Horlers of our own century, tin-ear writers have been outselling vastly superior authors of fiction three and four to one. From the beginning of the age of mass literacy to the present, critics and academics have had to face the unpalatable fact that the majority of the reading public which makes literature economically feasible will finish a work by Irving Wallace or Leon Uris and open one by William Faulkner or Evelyn Waugh without the slightest sense of changing pace or any awareness of fundamental differences between the writers except



Ragged Dick series, which made author a best seller, was based on life among lodging-house urchins.



Title of *Luck and Pluck* series was a giveaway: it took hard work *and* breaks to gain fortune.

variant story lines and different characters and settings.

The reason for this seeming "lack of taste," even among those who still read books rather than watch television (sometimes literary critics have the eerie feeling that they are talking only to each other), results from an almost universal public interest in narrative and character to the exclusion of anything else in the novelistic package. The crystal-clear erotic passages in the closing pages of *Ulysses* were what eventually sold that generally uncomprehended work to a mass public; *Madame Bovary* was popular because of the extramarital affair it featured; Dickens sold enormously because of his matchless comedy and melodrama. Virtually every novel of real literary worth with sizable sales has, in fact, simply struck some common chord of interest in a vital way. Style, subtlety and sharp originality of view are, sadly, irrelevant nonstarters with the general reader.

The juvenile readers of Horatio Alger differed, of course, in no way from their parents in literary sensitivity; the ex-ministerial resident of a Bowery boys' lodging house who wrote *Mark the Match Boy, Sink or Swim* and *Risen From the Ranks* knew his heroes and their rural and urban backgrounds better than any other writer for the popular story papers. And his boy readers recognized this at once, despite the strangled style or even the stilted *Oliver Twist* propriety of what passed for juvenile dialogue in his work, as evinced in this wholly typical selection from the popular *Wait and Hope* of 1877:

" 'I don't know what's going to become of us,' said Sam despondently. 'We shall be poor.'

" 'That isn't the worst thing that can happen to you,' [replied James.]

" 'It's pretty bad. You know how we have been accustomed to live. Now I shan't be any better off than Ben,' [Sam said.]

" 'Ben is happy enough. He has to work, of course, and so I suppose will you. But it won't be as bad as you suppose. It will make a man of you.'

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Best-selling Horatio Alger jr. longed in vain to write a deathless book.

" 'Father has treated us very badly.'

" 'He has done wrong; but he is your father, and it is better for others to blame him than you. Remember, Sam, that I am your friend, and if I can do anything for you I will.' "

Such exchanges aside, what Alger gave his fascinated readers of that long-gone time in openhanded abundance was a story line that was almost impossible to let go of once the reader had sampled it. Even today it is not easy to stop reading an Alger novel, so swiftly does the story move; despite his obvious infelicities, Alger still seems able to make his reader want to go one page further, just to see what does happen next to these feckless lads. This ongoing narrative hook was Alger's real gift, and it was the one and only essential ingredient for a wide readership then as now.

As a natural storyteller, Alger could have written about pirates, smugglers, explorers, or virtually any subject that boys would accept as holding exciting possibilities, and could have enjoyed some measure of financial success, although his seeming lack of melodramatic inventiveness probably would have denied him the

Bill Blackbeard is coeditor of the forthcoming book, The Smithsonian Collection of Newspaper Comics.

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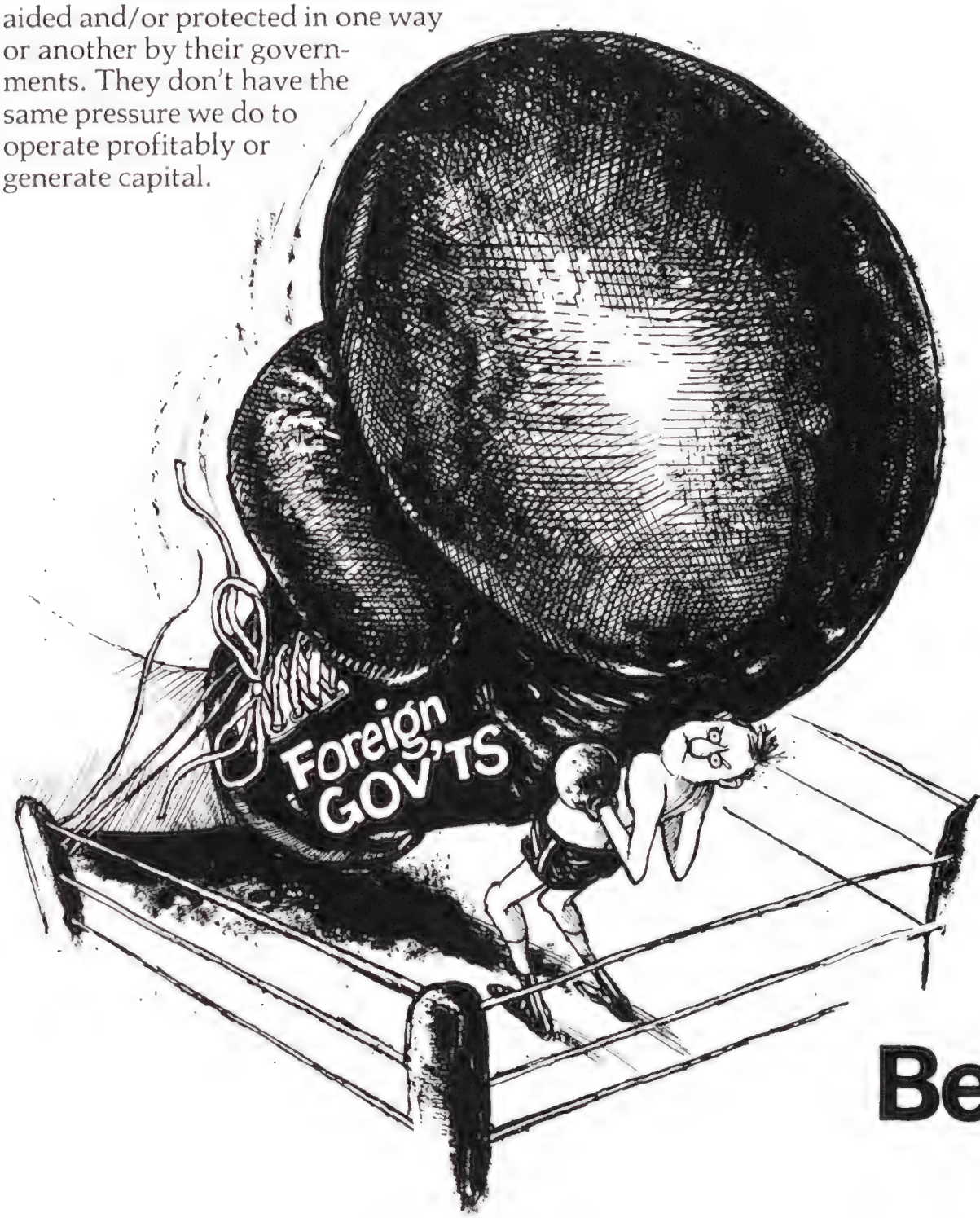

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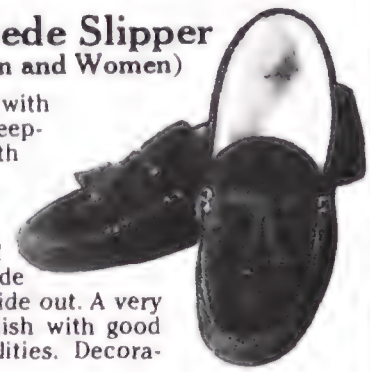

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top rung of popularity in out-and-out adventure fiction. As it happened, his actual choice of New York street boys and their struggles as a subject (in what was to be his first solid commercial success, *Ragged Dick* of 1867), was lucky, for it attracted juvenile readers at once, and directed the writer into what was clearly his most profitable literary path.

Of greater interest today is the fact that this path led directly to the great popular myth about Horatio Alger, which holds that he was the beloved preacher par excellence to American youth of the virtues of thrift, education and hard work as the means by which young men could attain ultimate financial success. This is still the widely accepted view of Alger, but it is almost without real foundation in either Alger's work or his own attitudes toward it. The Horatio Alger of reality, who wanted to be a seriously accepted adult novelist in the ranks of Dickens and Thackeray (he would in fact have been perfectly satisfied in lesser company), knew he was writing trashy popular entertainment for money and, to keep the money flowing, did his best to be entertaining from start to finish of a story. There were plenty of Sunday school tracts around, posing as novels, which futilely attempted to instruct boys as Alger later was supposed to have done; had he seriously tried the same sort of thing, his sales would have been sharply diminished.

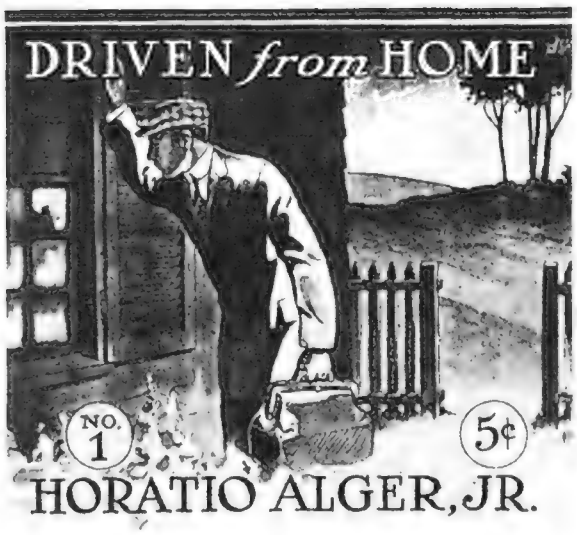
Let's have a look at the sadly comic career of the author who turned out more than 100 boys' novels in 40-some years, selling an eventual 30 million copies or more, and who died lamenting that he had never written a worthwhile book or had a son of his own to leave behind him.

Poor Alger was born on Friday the 13th of January 1832 in Revere, Massachusetts, the first-born of five children in the home of a Unitarian minister. His father was a fire-and-brimstone preacher who saw himself as the future spiritual leader of America, and was determined that his eldest son would pontificate loyally at his right hand as he rose to his proper ordained stature in the land. Accordingly, he raised the boy on the Bible, hymns and his own sermons, creating—as his son's nurse pointed out, on her exasperated resignation—more of a cathedral than a child. Overstuffed with knowledge beyond his years, a chronic stutterer and a child kept away from other children, the young Horatio had a miserable time at school, where he was tagged with the hated nickname of "Holy Horatio" by his peers.

His only friend and confidant in his youth was his doting, paternally eclipsed mother, Olive Fenno Alger. Mother and son supported each other in the often bleak household.

Once on his own, however, Horatio jr. did not fare too badly. Sent to Gates Academy in Marlborough, Massachusetts, at 14, free at last from his father's dominance, he flowered and was accepted fully by his fellow students. In fact, he became something of a leader in boyish hell-raising at the academy, risking expulsion by breaking windows in the home of the headmaster and setting immense bonfires in the town square. The elder Alger seethed, writing furious letters to his son, but the boy had tasted the outside world and found it to his liking. He now read everything *but* the Bible, went every-

Factory-boy hero (left) of *Brave and Bold* got to escort the girl home.



In 1911 a boys' nickel weekly made cover stories of Alger's yarns.

where in Marlborough except to Sunday school and church (when he could avoid them) and paid little attention to his father's letters, answering them as infrequently as possible. Holy Horatio had become a holy terror, and gloried in it.

But most of Horatio's nerve and defiance was group-derived. Home for Christmas and other holidays, and face to face with his father and equally upset mother, the boy caved in at once, promised faithfully to mend his wayward ways, and joined everyone at prayer. Underneath, unsurprisingly, he had changed very little; for all his outward aping of other boys, he was still very much the pious, proper fellow his father had so forcefully created.

Harvard, which the bright student entered after two years at the academy, changed him little but exposed him to the mainstream of literature for the first time. Encountering Herman Melville's whaling epic, he made a delighted entry in his Harvard diary: "Am reading *Moby Dick*, and find it exciting. What a thrilling life the literary must be! Imagination and observation—these I take to be the important requisites. Would it be desirable for me to take up writing as a life work? . . . Have I the ability to write? Why not—if I am conscientious and observe closely all that goes on about me?"

Writing began to seem a means of escape from the clerical life his father had planned for him. But he was rudderless, indecisive, unsure of his talents. Lacking the nerve to strike out on his own, he took his bachelor's degree from Harvard in 1852, found a night job teaching languages at a Boston private school to support himself, and prepared meekly to

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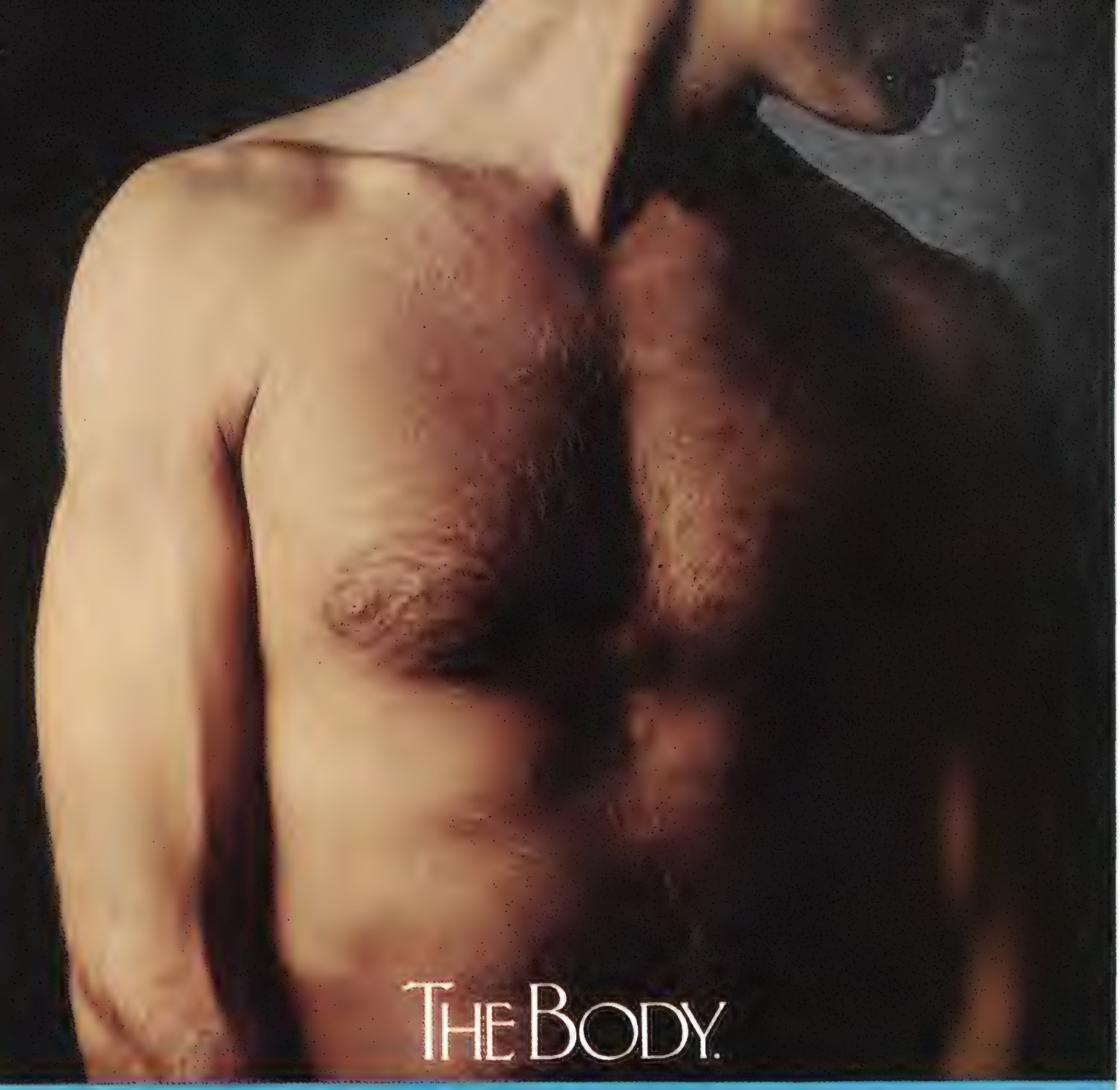
Statue of Liberty made it obvious: Alger's paper boy was *A New York Boy*.

enter Harvard Divinity School. An adolescent love affair, scotched near the outset by his vigilant father, and an abortive turn at helping edit a minor religious literary weekly, the *New England Review,* represented the hapless Horatio's only serious attempts at the time to defy the ecclesiastical fate the senior Alger had prepared for him. The end of the boy's dreams seemed at hand. Once through Harvard Divinity and expecting the promised attendance of his proud parents at the ceremonies, Alger felt the tantalizing hopes of literary acclaim and bohemian pursuits fading. He could already feel the tight, white collar around his throat, see the black drape of clerical garb on his small, dumpy body.

Then a twist of events, like a real-life Alger story occurring before he had written any, presented the boy with its unexpected, unbelievable climax.

An old, white-haired widower named Floyd Thurstone, owner of a large Cambridge house at which Alger roomed while attending Harvard, had badly needed money to meet a mortgage payment. Concerned, the young Horatio had worked day and night, while keeping up with his regular studies, to write an entry for a prize essay contest sponsored by the university. Alger's entry, "Athens at the Time of Socrates," won the $40 first prize,



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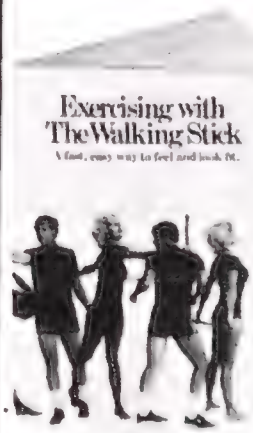

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which the boy turned over to Thurstone to ease the mortgage pressure. During his years at Harvard Divinity, Alger had moved to other premises and almost forgotten Thurstone. But the old man, who had prospered a bit later, died abruptly just before Alger's graduation, and left the boy $2,000 in his will.

Notified of his good fortune and presented with a check the day before his parents were due in Cambridge, Alger picked up his diploma a day early and booked passage for Europe with two of his old friends from Gates Academy, leaving without a word to his parents.

Typically, Alger blew Thurstone's $2,000 (a small fortune in the 1850s) in London and Paris without writing a word

In *Jack's Ward* hero was assured: "You know how to pay off your debts."

of commercial consequence or having any thought of whence the next day's income would materialize once his bonanza was gone. After pestering Charles Dickens with attempted visits (the wise man was "never at home"), and living with street girls in Paris while he took endless dull and fatuous notes about the city which he was never to use in anything he later wrote, Alger went back to America and into the forgiving arms of his patient mother. He survived the early years of the

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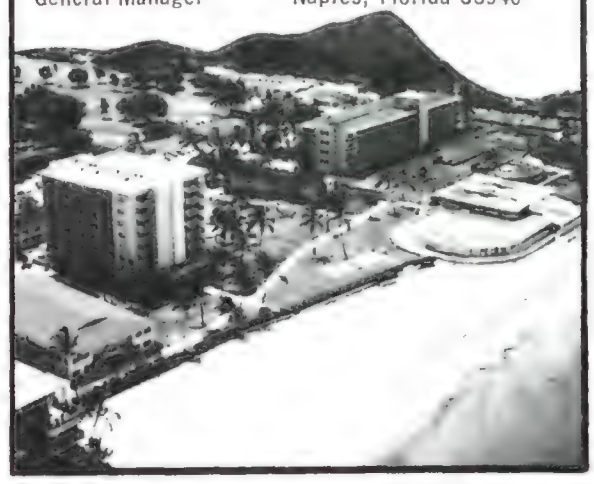

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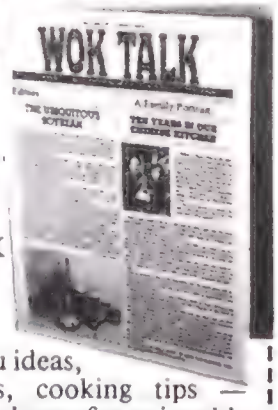

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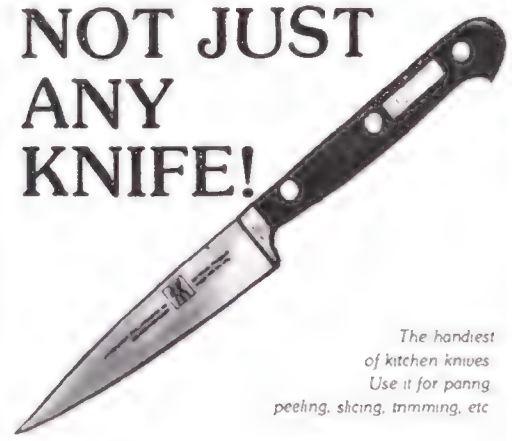

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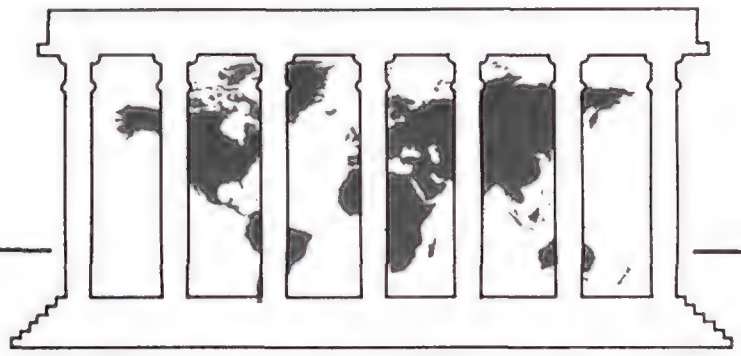

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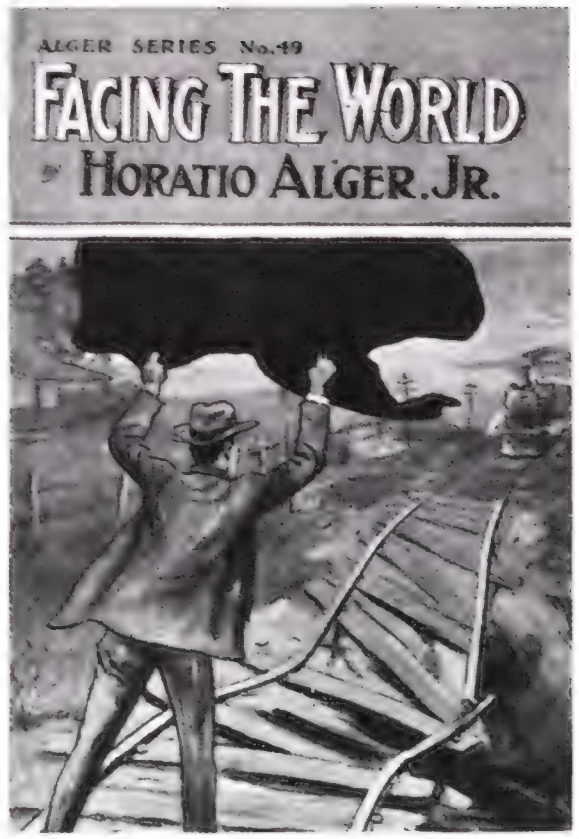

"The Haps and Mishaps of Harry Vane" subtitled this Street & Smith reprint.

Civil War, in which many of his old school chums fell in action, thanks to an oddly recurrent series of broken arms and other ailments which kept him out of the army and in such jobs as civilian recruiting officer. Then Alger (who had managed to write and publish one small volume of highly derivative short stories, *Bertha's Christmas Vision*, a nonseller of the late 1850s) finally entered the ministry, to the pleasure of his father, in December of 1864, becoming pastor to a Unitarian flock in Brewster, Massachusetts.

The Civil War was still raging, but the secure Alger was now able to evidence his fervent patriotism by writing novels about the boys in blue; *Frank's Campaign* appeared in 1864, *Paul Prescott's Charge* in 1865—both brought out by the publisher who was later to print his famed street- and farm-boy books, the canny A.K. Loring of Boston. With the advent of peace, Alger wrote his first novel about a girl in early 1866, *Helen Ford*. (It was not his last; another, and the best known, was *Tattered Tom* of 1871: Tom, despite the name, was a girl of the streets.) Loring derived some small profits from his works and asked for more, but there was no hint of the massive surge of sales to come.

Alger suddenly resigned his pastorate in March 1866 to seek his fortune by his pen. Moving to New York, the 34-year-old writer attempted his first adult novel,

a sophomoric affair called *Timothy Crump's Ward*, which the unimpressed Loring published anonymously to very few sales (and later salvaged by having Alger rewrite it as one of his boys' series titles, the *Jack's Ward* of 1875). Pressed by Loring for another juvenile book, Alger decided to base one on his most recent observations at the Newsboys' Lodging House on Fulton Street in Manhattan, an institution which had fascinated him since he first encountered it during one of his endless evening walks around the city.

The hero of the resulting novel, *Ragged Dick, or Street Life in New York with the Boot-blacks*, was based on Alger's firsthand contacts with the street boys at the lodging house.

Alger's *Ragged Dick* was probably the plodding writer's most genuinely human and believable creation. Still fresh and excited from observing the grubby reality, Alger neglected the cosmetic primping-up his later heroes and heroines received, and presented Dick as a boy who swore, smoked, gambled and enjoyed such entertainments as Barnum's Museum, where, as the 15-year-old remarks after earning 50 cents, he means to go " 'and see the bearded lady, the eight-foot giant, the two-foot dwarf, and the other curiosities too numerous to mention.' "

Before *Ragged Dick* appeared as a book, Alger was canny enough to pick up the extra money to be had from serializing the story in a popular story paper of the time—and virtually all of his later novels were to be serialized before book publication. It was *Ragged Dick's* appear-

Frontispiece to this *Tattered Tom* of 1871 was captioned, "Gi' me Two."

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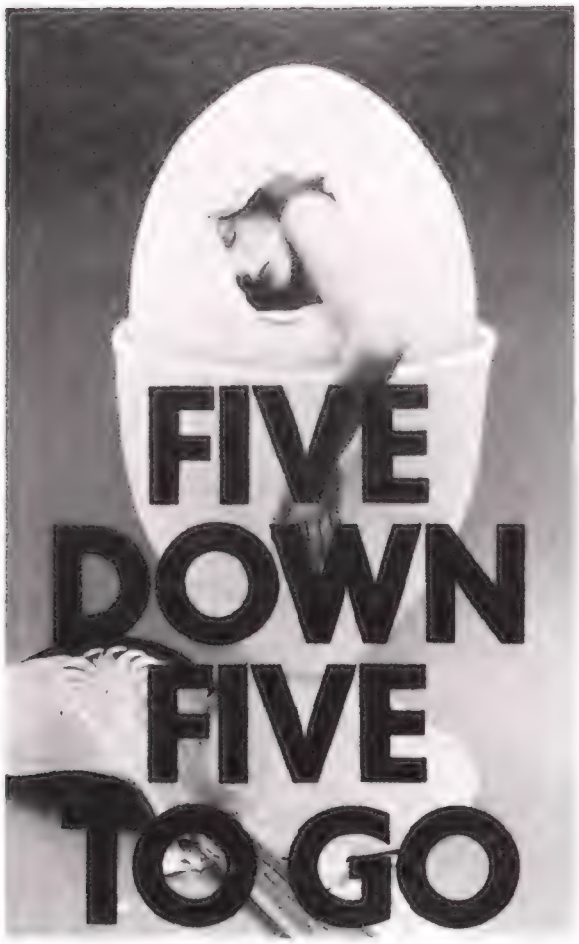

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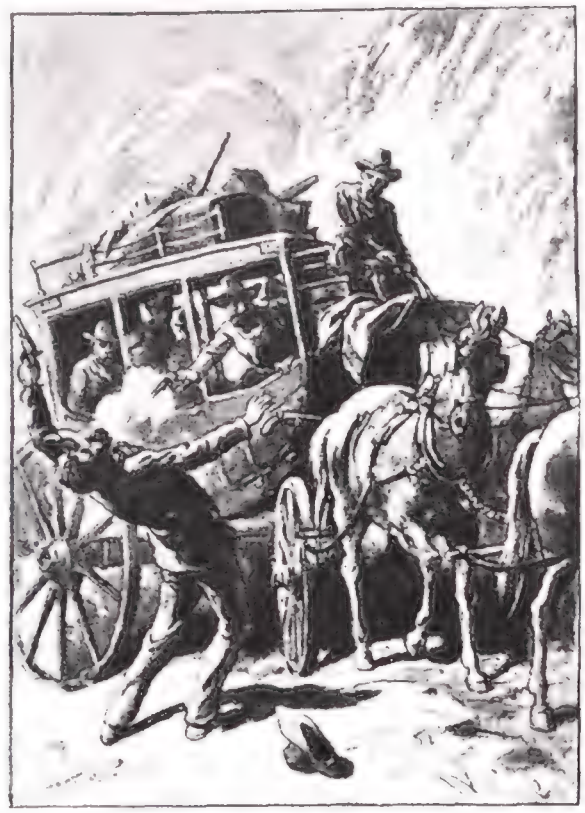

"Road Agent Meets His Match" is from 1892 thriller about gold digging.

ance in the weekly *Student and Schoolmate* of mid-1867 that took thousands of youthful readers by surprise and delight, and paved the way for the book sales to follow. Here at last was a writer who seemed to know just what many boys across the country wanted to know: how *did* boys fare and prosper in the great metropolis of New York? *Was* there hope for kids in such a place, up against so many people, so much power and money and corruption? Alger's *Ragged Dick* seemed to say "yes" to the last question, and seemed realistically to detail the answers to the first. The kids wanted more, much more.

Alger and Loring saw to it that they got it, of course—scores more books over the rest of the 19th century. Before long, Alger had moved into the Newsboys' Lodging House as a permanent resident to aid in the institution's direction. Now it had become clear that the national juvenile interest in Alger's details about the ways in which big-city kids manage to survive and achieve had been supplanted by the certainty that every new Alger would be a gripping "read," sufficiently like the ones that had come before to ensure an evening's engrossing entertainment. And, best of all, the up-front morality of the books assured parental approval and often purchase. It was a great setup for Alger and the kids alike.

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But a shortage of energy for agriculture means more than scarcities or high prices for food. Its economic impact would be enormous, affecting people and jobs involved in every link in the food chain—from growing, through processing, packaging, transportation, wholesaling, retailing, storage and preparation. Moreover, the agricultural products we export are immensely important to our foreign policy and balance of payments.

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We believe national policies that recognize the absolute necessity for enough energy to meet our country's basic needs must be developed and must require:

—Vigorous conservation of energy and stepped-up research on new technologies;

—Greater reliance on coal and nuclear power, including the breeder reactor;

—Regulations that encourage, rather than block, needed and environmentally sound development of energy resources;

—Promotion of load management techniques; stronger and more flexible transmission facilities and wider power pooling.

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It was the kids' parents, amusingly enough, who seem to have begun the great popular myth about the Alger books. Not really interested in reading the novels, Victorian parents made the small imaginative hurdle to the logical assumption that the books made a one-to-one connection between hard work, study and perseverance on the one hand, and certain rise to success on the other.

But they didn't; they never did. Alger was too instinctively good a storyteller to ruin a plot by such assumptions, and his readers were generally too realistic even at their tender ages to swallow such ideas. Virtually all the successes to which Alger's heroes ascended at the close of his chronicles were the result of the wildest coincidences or lucky happenstances. A child rescued from drowning by an Alger hero, fortunately on the spot at the right time, turns out to be the long-lost heir to a fortune, the strayed son of a millionaire or a pathetic old man who, helped in time of need by the hero (shades of Alger's Floyd Thurstone), later showers unexpected gold on him just as the mortgage falls due on the parental home.

Thus the Alger story of actuality. Sadly, there seem to be no examples that follow the mythic concept of the "typical" Alger novel. The master's novels were all great fun and games for juvenile readers of the time and later, dealing amusingly with the accession to wealth and sometimes fame as functional themes; but none was ever a deliberate tract in the sense that *Ten Nights in a Bar-room* was a tract.

Alger died on July 18, 1899, at his sister Olive's house in South Natick, Massachusetts—still longing to write the great adult novel he so fondly believed it was in him to write. Unmarried and childless, his regrets at not having sired a son were countered at his deathbed by Superintendent Theodore Heig of the Newsboys' Lodging House, who pointed out to him that he had more sons than any other living man: the legions of boys who had devoured his books by the millions. Thus comforted at the end, he slipped away, perhaps thinking of the epitaph he had once written for himself, out of his book titles, in a light moment. It read:

"Six feet underground reposes Horatio Alger, *Helping Himself* to a part of the earth, not *Digging For Gold* or *In Search of Treasure*, but *Struggling Upward* and *Bound to Rise* at last *In a New World* where it shall be said he is *Risen from the Ranks*."

Horatio Alger's books, sadly, will not "live forever." A number of them have been republished in the past decade, but they are scarcely remembered today by most young adults; and yet the myth that grew up about them may survive as long as the nation itself, and that is a kind of immortality after all.

"The Father Exclaimed, 'My Boy Is Overboard, and I Cannot Swim.' " Woe!

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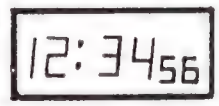

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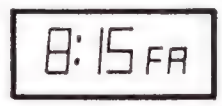
AUGUST 15th FRIDAY



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3. Its elegant styling will compliment any attire – and elicit compliments from your associates and friends.

4. At this price you can not find a better buy.

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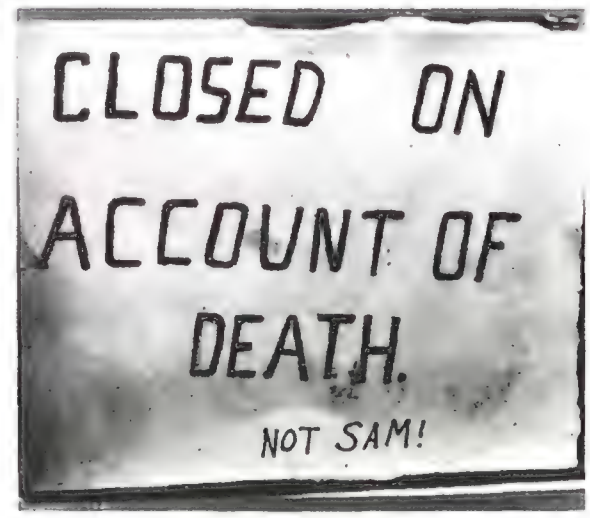
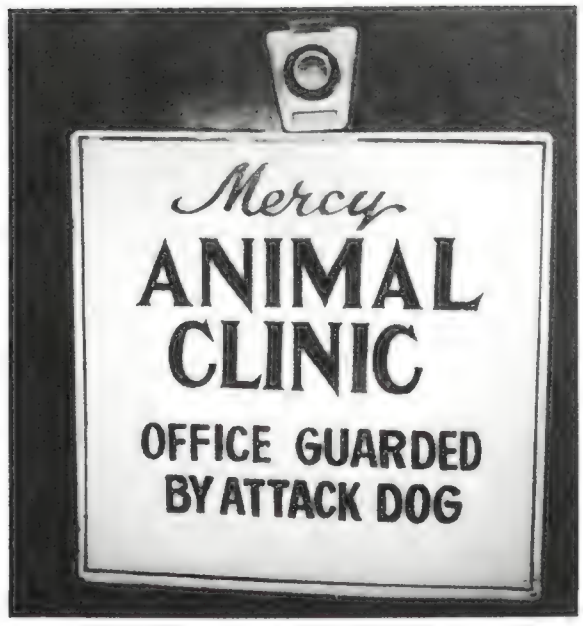
Photographer plays hooky from beauty

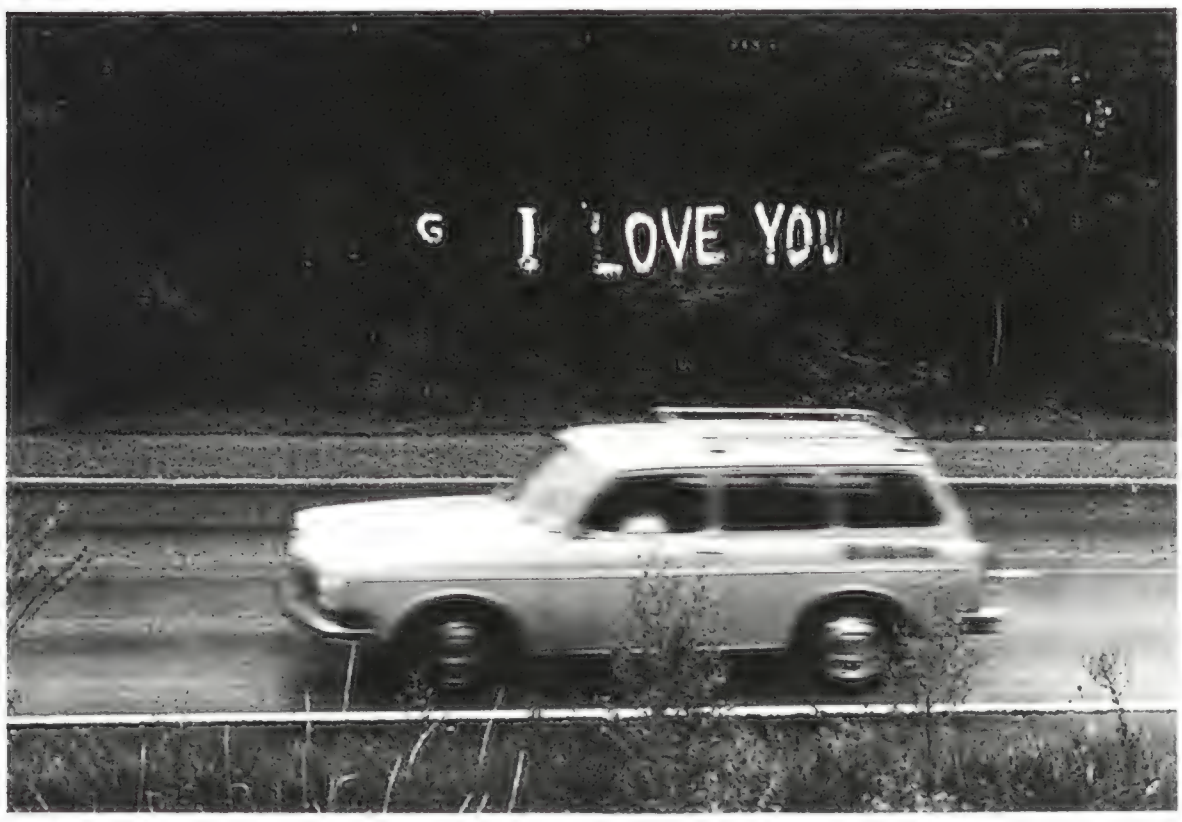


That Photographer Lee Boltin is a lover of beauty is amply evident to SMITHSONIAN readers. They need only to look back on his eye-filling articles on everything from the Institution's famous gem collection to the King Tut exhibition.

Still, it's a long way from the Paul Getty museum in California to what was ancient Thrace, and there are other sights in between, some of which he photographed. Boltin's humor is sometimes macabre (see cover of his new Ballantine book, above) and almost always wry, as shown by his uncaptioned samples on these pages.

Now that this long-contemplated collection is in print, Boltin promises to go straight and return to art, ancient artifacts, beauty and culture.





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• NDZ 45

"Picnic" at a hobo jungle—including a bottle being guzzled at far left—

Hoboes told all to 1890s scholar

What was it like to ride the rods with Pittsburgh Phil and other 'jockers'? This curious clergyman got replies

By Roger Bruns

Songs and legends surround the world of the tramp, giving voice to the fantasies and spiels of the seasoned "jocker." But usually our secondhand impressions of the classic hobo contrast sharply with reality. His was a world, often wretched and dangerous, of train "jumpers" in "Pullman side-doors"; of "Magpies" and "tomato-can vags"; of "riding the rods" and "mooching"; of running from "bulls"; of "picking gooseberry bushes."

The world of the tramp was definitely not the world of an Ohio-born clergyman and college professor named John James McCook. Yet it was the Reverend Mr. McCook of Hartford, Connecticut, who, when named in 1890 to chair a committee to investigate the distribution of municipal funds to paupers, launched an exhaustive study of the hobo population across the country from flophouses to jungles, from railroad yards to saloons.

One of 15 "Fighting McCooks" who served in the Civil War, John McCook was ordained a deacon in the Episcopal church in 1866, became a rector and, in 1883, joined the faculty of Trinity College in Hartford. Active in local civic affairs, he began to voice concern over the amount of money being directed toward alms for paupers. His chairmanship of the alms committee led the austere professor into a personal study which was to consume his interest until his death in 1927 at the age of 83.

McCook dogged the rod-riding community with zeal, interviewing tramps on the streets, gathering information from police and reformatory officials, visiting almshouses and public baths. From the wayfarers' lodges where they slept to the boxcars where they rode, McCook sought them out. In 1891, he drew up a questionnaire which elicited more than 1,300 responses from tramps across the country. He photographed them attired in their ever-present bowlers and ill-fitting clothes, some of which was staked by McCook and his son Philip, who took many photographs of tramps.

had been plucked from clotheslines or, as they called them, "gooseberry bushes." He conducted chemical tests on the various brands of liquor they consumed. He ate their mulligan stew. He watched police prod lumps of hay in a "Bull Barn" to ferret them out of hiding. He tailed them for hours at a time, jotting down their haunts and hangouts and plotting maps of their journeys. The gentleman scholar and clergyman of Hartford thus got to know Pittsburgh Phil and Connecticut Fatty, among numerous other hoboes, extremely well.

It was an intriguing world. If the tramp represented freedom and individualism, he also represented failure. If he stirred feelings of sympathy and pathos, he was also a figure of disgust and contempt. Jack London wrote of being drawn into the hobo society in the 1890s: "They were road kids, and with every word they uttered the lure of The Road laid hold of me more imperiously. . . . And it all spelled Adventure." He later called this world "the pit, the abyss, the human cesspool, the shambles and charnelhouse of our civilization."

Mr. Bruns' book on antislavery crusade in Revolutionary America, Am I Not a Man and a Brother, *just came out (Chelsea House Publishers and R. R. Bowker)*

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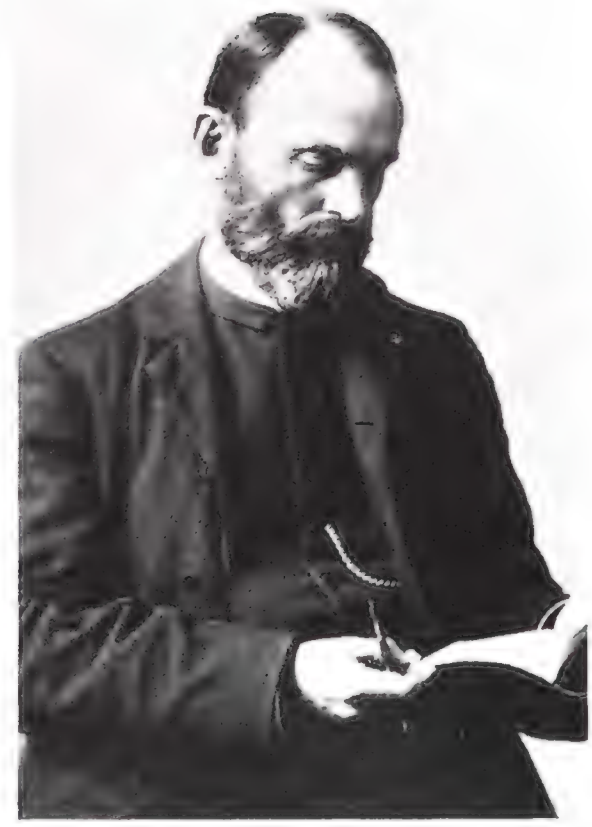


John McCook was a language teacher as well as a hobo investigator.

McCook discovered that much of the lure of vagabondage which had gripped men such as Jack London resulted from the growth of railroads. By the end of the 19th century, they laced the country with almost 200,000 miles of track reaching nearly every county in the United States. They brought not only mobility, but romance. The wail of the ugly, soot-belching engines touched a nerve of restlessness and stimulated visions of places never seen and things never done. When the financial crash of 1873 and its subsequent depression threw thousands of men out of work and into vagrancy, it was to the railroads that many turned.

Henry George, the American economist and philosopher, wrote that "The 'tramp' comes with the locomotives, and almshouses and prisons are as surely the marks of 'material progress' as are costly dwellings, rich warehouses, and magnificent churches." If the late 19th century produced the Rockefellers and the Carnegies, it also produced Philadelphia Shorty and Providence Bob.

Allan Pinkerton, founder of the Pinkerton National Detective Agency, the well-drilled, fearfully effective armed force paid by industrialists to break the heads of unionists and strikers, published in 1878 a work entitled *Strikers, Communists, Tramps and Detectives.* Pinkerton,

From the British Royal Mint

For only the fourth time in over 1,000 years...

The *Obverse* shows Her Majesty Queen Elizabeth II on the Coronation Throne wearing the Coronation Crown holding the twin sceptres of rule.

The *Reverse* depicts (from above) the outline of a stylized Coronation Crown with the traditional English Tudor Rose at the center.

Shown actual size 57mm (2¼")

IN 22 carat gold.

For only the fourth time in the over 1000 year history of the British monarchy, the British Royal Mint will strike a unique and magnificent official gold Medallion to commemorate a sovereign's Jubilee. The only two previous monarchs commemorated were Queen Victoria, for her Gold and Diamond Jubilees, and King George V for his Silver Jubilee. Now, this exceptional mintage commemorates the first quarter century of the reign of Queen Elizabeth II.

All Medallions are 22 carat gold and multiple-struck by the Mint for a distinctive Matte Proof finish. The Issue is in two sizes:

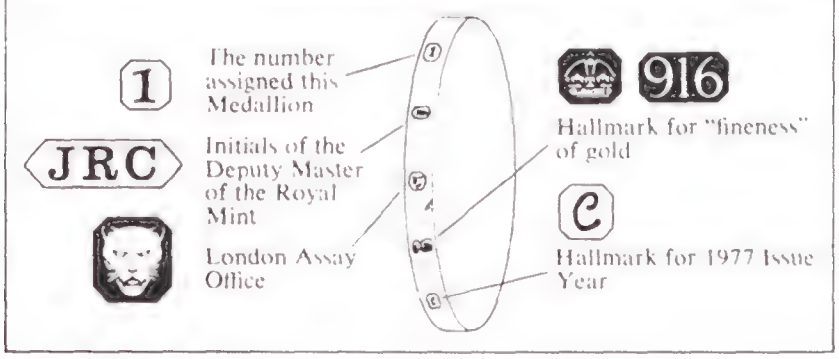
The Grand Size – 57mm (2¼") in diameter, 151 grams, 4.87 troy oz.
The Standard Size – 44mm (1¾") in diameter, 90 grams, 2.89 troy oz.

This historic Issue is distinguished in 7 important ways

1. So Limited: A maximum of only 1000 Medallions of each size will be minted for the entire world. Only 500 of each size are allocated for all North America. A strictly limited number of both sizes are reserved for issue as "matched sets."

2. So Unique: All Medallions are struck to order and individually numbered. Each Medallion is stamped with five distinctive Hallmarks.

Five Distinctive Hallmarks Stamped on the Rim (Edge)



3. So Special: Each Medallion is individually assayed by the London Goldsmith Co. and bears its Hallmark attesting to the 91.6 "fineness" of the gold content.

4. So Authentic: Each owner receives an official Royal Mint "Certificate of Authenticity" with his name and Medallion number written in by hand.

5. So Historic: Each owner will be officially invited by the Royal Mint to attend and witness an historic ceremony (date to be announced) at which the dies of these unique Medallions are forever destroyed.

6. So Valuable: Each Medallion's gold bullion content alone, is worth approximately half the purchase price (international gold market rates as of the date of this writing). And, this does not even begin to take into account the enormous numismatic collector value of this extraordinary Issue.

7. So Rare: Since this is only the fourth gold Medallion of its kind in over 1000 years, substantial demand worldwide is anticipated from knowledgeable collectors; thus, "Reservations" can only be accepted subject to Medallions still being available as of receipt of the application.

Available exclusively from Charlton International Official Agents to the Royal Mint for this Issue

Applicants may make reservation to examine these historic gold Medallions through Charlton International, Canada's leading numismatic dealer. (Bank: Bank of Montreal.)

Purchase is strictly limited to only one Medallion — or to one "matched set" of the two sizes. (Both Medallions in a "matched set" will have the same number.) All Medallions come in a distinguished Royal Mint Presentation Case.

30 Day Examination Guarantee

Applicants will be assigned a priority number in order of the receipt of their "Reservation". Thus, parties making the earliest reservation have both the best assurance of supply and possibility of acquiring the Medallions stamped with the lowest number.

Purchasers may examine the gold Medallions for 30 days and have the right to return the Medallion for a complete refund.

Medallions are struck to order by the Royal Mint in Britain, applicants will be informed of proposed delivery dates after our receipt of the "Reservation Application"

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RESERVATION APPLICATION

Charlton International
Official Agent to the British Royal Mint
56 W. State Street, Westport, Ct. 06880

Please reserve in my name the historic, official 22 carat Gold Medallion struck to order and individually numbered by the Royal Mint to commemorate the first quarter century reign of Elizabeth II. I also receive a "Certificate of Authenticity" from the Mint with my name and Medallion number written in by hand, and will be officially invited by the Mint to witness the destruction of the dies at a date to be announced. I wish to order:

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whose redoubtable "We never sleep" organization, while under the employ of the railroads, also broke tramps' heads, described one of the early rail riders in this way: ". . . A tramp boarded the train at Cheyenne, climbed to the top of the coach, and enjoyed hugely his elegant and rapid manner of making his journey until Sherman was reached. At that point the engineer got a glimpse of him and he at once began throwing a heavy shower of cinders and increasing the speed . . . to the utmost power of the engine. . . . The cinders burned into his clothes, cut his arms, legs, and face. . . ." When the tramp later descended, Pinkerton remarked, the boy of 19 looked more like "an old man of sixty."

By the 1890s the number of such railroad hoboes had increased dramatically since the time of Pinkerton's book. John McCook saw the link between the tramp population and the eddies of industrial panics and labor strikes. The first employees fired were usually alcoholics. Then single men—those with few family ties and little self-discipline—were let go next. As the statistics from his questionnaires were totaled, McCook concluded that the hoboes constituted a veritable army of approximately 50,000 wanderers. "So much driftwood," he lamented, "by what winds and waves tossed, when and where to be finally engulfed!"

McCook discovered that the majority of this "Peripatetic Aristocracy," as he called them, had been tradesmen or artisans such as weavers, shoemakers, stonecutters, machinists and masons; an overwhelming proportion were single men, although there were a limited number of "Magpies" and "Petticoat Bums"; most were under 40, with approximately five percent under 20; most were white Northerners; a majority had never voted—although some had, for a handout, voted several times in single elections; an overwhelming number were alcoholics; approximately ten percent admitted that they suffered from venereal disease; 90 percent were literate.

On a typical night, tramps could be found bedding down in police stations, almshouses, boxcars, barns, toilets, livery stables, railway shanties, hobo jungles—anywhere a human being could find a modicum of comfort and protection. They rode in boxcars ("Pullman sidedoors") or in the open freight cars or "gondolas"; they hung onto the "death

Stung by cinders, an 1890s hobo rides the bumpers between two boxcars.

woods," the planks above the couplings of boxcars; they hid in the engine tenders; they perched on the cowcatchers; they clung onto the top deck, the board down the center of boxcars.

Some even engaged in "riding the rods," a well-worn phrase for the most harrowing mode of railroad travel. The truss rods supporting the middle of a boxcar were generally aligned in pairs from one to four feet apart. With a plank between they could support a body. Suspended inches above the cindery railbeds as a train hurtled forward, the rod-riding hobo was exposed to dangers so obvious they need no elaboration.

One tramp told McCook that he had once leaped from a railroad platform into a gondola while it passed at full speed. The impact ripped every button from the jumper's coat, but left him unhurt. Other jumpers were not so lucky. Horror stories abounded of men being locked in cars until they suffocated, of fingers, arms and legs lost, of being shot by railroad "bulls" and knifed by fellow riders. A man told McCook of seeing a tramp run over by one train as he was about to hop another. "When we fall off," one tramp gruesomely quipped,

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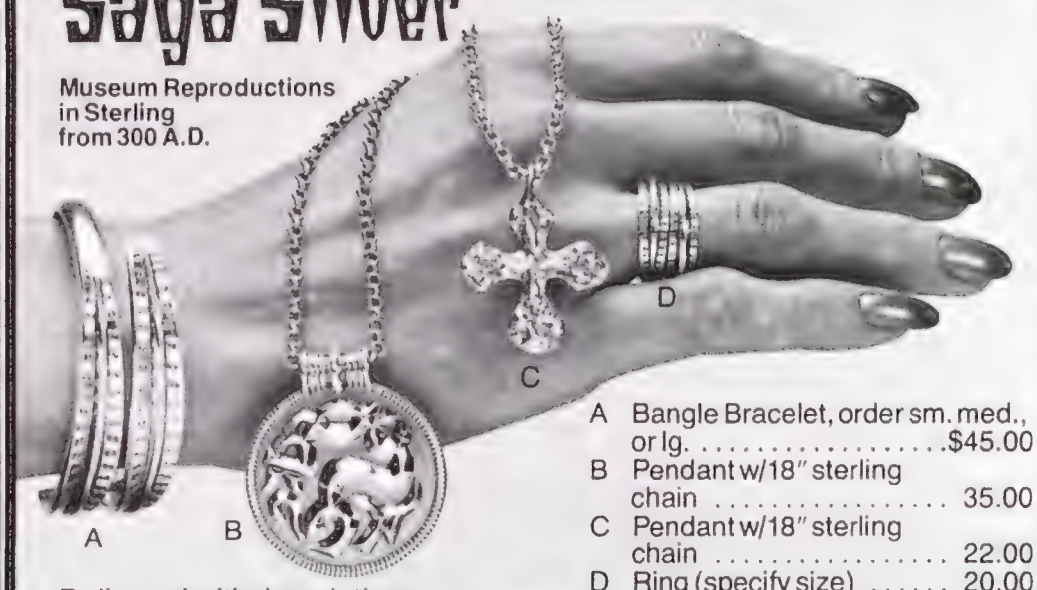

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This jumper gets a hand as he swings onto a ladder. A slip means death.

"there is a fight between the towns as to which shall furnish the box!"

McCook's investigations compelled many "Knights of the Road" to pour out their stories in great detail, as they never had before to an outsider. In Marshall, Texas, one "Bob" penned a 12-page letter to the professor, explaining that he had run away from home at age 12, fallen in with thieves, spent time in reformatories and prisons, escaped and joined the ranks of hoboes. Determined never to return to prison, Bob carried an "emergency pill" of cyanide in case of capture. As he lounged in the woods that he called "Hotel de Bum," with an old mule "nosing around" his feet and with his friends Denver Shine, Oregon Bob and Colorado Slim nearby, Bob wrote to McCook: "Your tramp found his greatest pleasure in the beauties of nature. . . . I have seen most of the scenery of the west, but never could thoroughly enjoy it, unless I could feel tucked away, somewhere next my skin, a wad of that green stuff. . . ."

For nearly a quarter of a century the professor corresponded with William (Roving Bill) Aspinwall, a veteran hobo who never met McCook personally, but who learned from a fellow wanderer of

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Complete this simple questionnaire, and befriend a needy child through Save the Children. For only fifty-two cents a day, your money, combined with that of other sponsors, can breathe new life into an impoverished village...help hard-working people in their fight for dignity...turn despair into hope for a child who has known only disaster. Fifty-two cents may not buy much where you live. But for the poorest of the poor where the need is so desperate, it can work miracles. SM 11/7

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☐ Boy ☐ Girl ☐ No preference

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☐ Upper Volta

3. Would you like a picture of your sponsored child?

Shortly after we select a child for you, we can send you a photograph and brief personal history, if you desire.

☐ Yes ☐ No

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☐ Yes ☐ No

5. Would you like information about the child's community?

Several times a year you can receive detailed reports on the activities and projects being undertaken in the community to benefit your sponsored child. These community reports show how your money is being used most effectively for permanent improvements to the child's environment—for health care, education, food production, nutrition, and community training. Would you like to receive such information?

☐ Yes ☐ No

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☐ Yes ☐ No

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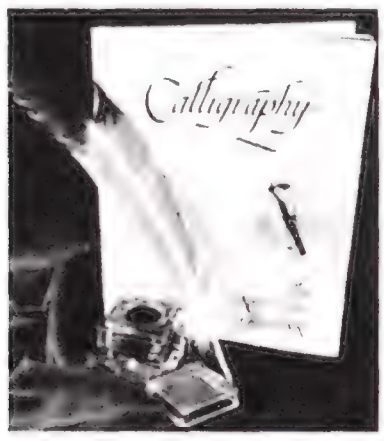

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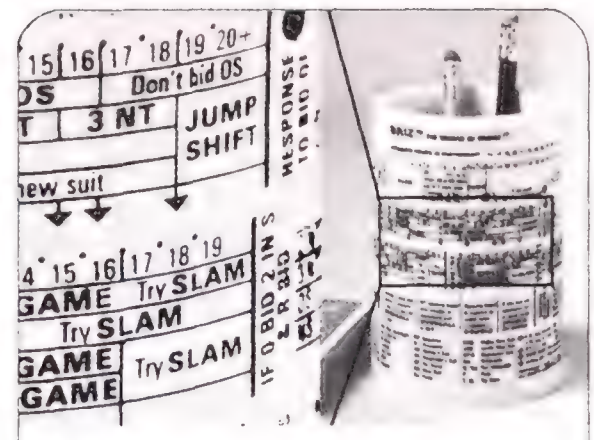
Seeking handout, bum tugs at pants.
"They got him arrested," noted McCook.

the minister-teacher's avid investigation.

A former correspondent for a rural newspaper, Aspinwall had been wounded in the Civil War and had later taken to the bottle and the road. Wrote Roving Bill: "My Present Business will not allow of me going by Rail. If I went so I would not get Mush-Faking or Umbrella mending to do. I have walked ever since I left N.Y. City. Came by the way of Bridgeport, New Haven, Hartford and all intermediate towns and then to Williamantic, Jewett City. I have asked no one for alms since leaving New York. Have made enough to live by going hungry at times. I have slept most of the time in the 'Haut Beaus' 'Sweet Home,' the friendly Box Car; and nights that are too cold for the Box Car I look along the R.R. for a secluded nook and build a fire out of R.R. ties and sleep as comfortable as I would in a king's palace. . . ."

McCook found a societal hierarchy among tramps. Train jumpers were considered the aristocracy, "pike bums" (those who walked from town to town) occupied the middle class, and "mission" bums of the city were at the bottom. "Tomato can vags" and "gay cats" who searched garbage cans for food or finery and begged from other tramps were beneath classification.

The tramp community also had something of a sense of fraternity. Hoboes



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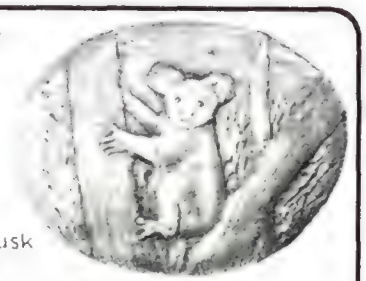

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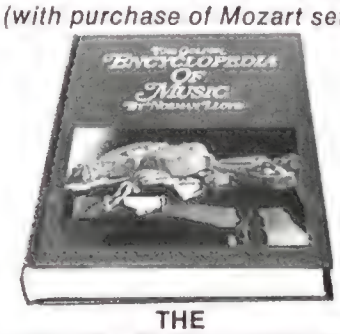

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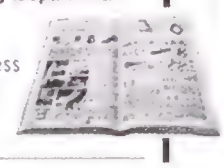

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11) PUBLICATION. Entrants' photographs not selected as prize winners, but published by Maupintour, receive $25.00.

FOR INFORMATION and complete rules, contact your Travel Agent or Maupintour, P.O. Box 807, Lawrence, Kansas 66044. Entries may be sent direct to Maupintour using information listed.

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passed along information about sources of food, favorable and unfavorable train lines, the whereabouts of fellow wanderers. At times they held conventions and elected kings. A whole body of folk songs emerged from hobo jungles. Unquestionably the most emotional tramp song in the early period was *Where is My Wandering Boy Tonight?*, written in 1877. McCook remembered hearing an occupant of a police jail cell wailing in his drunkenness the refrain:

Once he was pure as the morning dew
As he knelt at his mother's knee.

In lectures, speeches and articles, McCook set forth various remedies for the plight of the shiftless sojourners. Liquor, he concluded, was perhaps the most ruinous evil. After several of his spying expeditions at local saloons, McCook determined that some of his boys were not uncommonly consuming upwards of 25 drinks—more than four pints of whiskey—in 24 hours.

A Hartford politician who had been Overseer of the Poor told McCook that 90 percent of the paupers were alcoholics. Although McCook opposed prohibition because of the problems of enforcement, he did suggest governmental control over the manufacture and distribution of alcohol. He also cautioned the public against providing handouts; a quick stake only kept the saloon doors swinging.

McCook insisted that tramps must be made to work for public lodging. He pushed for a reformatory system geared to rehabilitate vagabonds. But the roots of the tramp problem, he believed, were so deep that only a miraculous sociological transformation could provide the

Hartford "bulls" arraign their 3 A.M. roundup of hoboes. The words may derive

total answer. "Abolish industrial booms," he wrote, "financial crises, business slumps, hard times! Encourage marriage! How? Do you ask? Really I don't know!"

McCook also recognized the paradox that many men who had been introduced to the nomadic life actually preferred it. "Apparently when the charm is broken," McCook wrote, "and one discovers that virtue can be disposed with and that contentment can be had some other way, there are a great many who resign domesticity permanently. Just as a horse is spoiled for the harness when he has once or twice successfully run away." McCook had often heard the hoboes talk of the siren's call of wanderlust, the setting free of the spirit. Connecticut Fatty had once said that there were only two "really happy" men in the world—the millionaire and the bum.

John McCook never published the book on tramps as he had planned. His efforts to establish a reformatory in Connecticut were drowned in political bickering. But the professor left a remarkable series of essays on tramp life and a body of statistical information on the underclasses unparalleled in his day. (*The Social Reform Papers of John James McCook* are now available on microfilm through The Antiquarian and Landworks Society, Inc., Hartford.)

The advent of the automobile and other forms of transportation and the modern technology of the high-speed railroads have made the boxcar hobo something of a dying breed. But many vagabonds are still on the road and still wandering the city streets. Many of the problems McCook studied remain. And the call of the road is still there.

rom *haut beaux* (the origin of *that* s vague) or from a greeting: "Ho, boy!"

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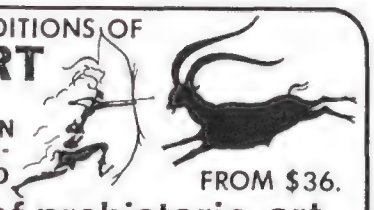

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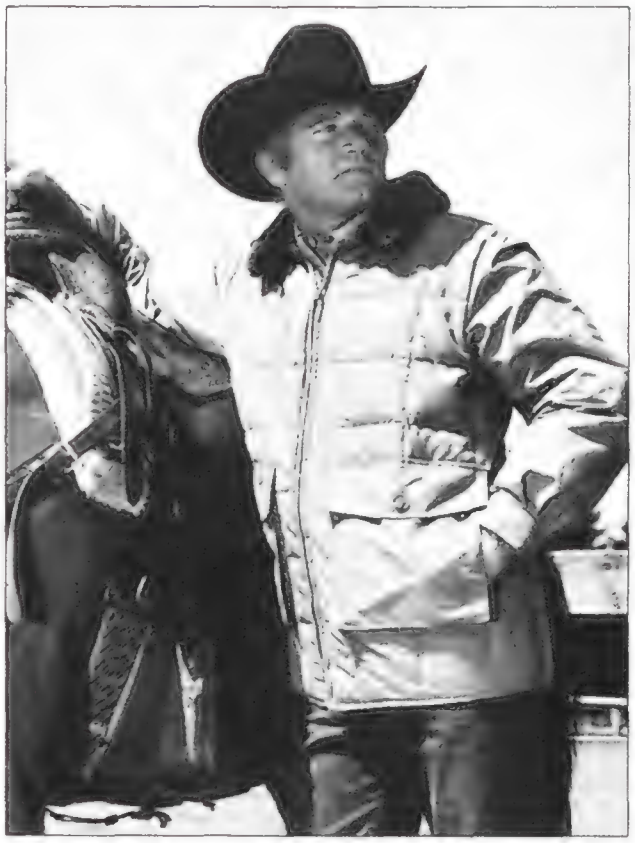

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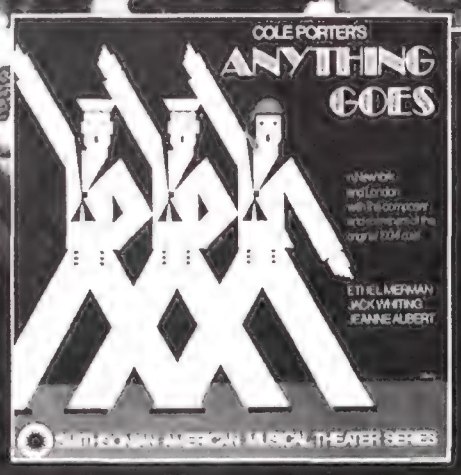

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Book reviews

The World of Roger Tory Peterson: An Authorized Biography
John C. Devlin and Grace Naismith
(N.Y. Times Books, $14.95)

Roger Tory Peterson's Dozen Birding Hot Spots
George H. Harrison
(Simon and Schuster, $9.95)

In its own way, each of these books offers a significant contribution to the apparently insatiable appetites of America's reading bird watchers. The first is a chatty and intimate review of the life of the distinguished American who must be the most widely known birder and the most influential popularizer of birds since John James Audubon. The second offers similarly chatty and intimate bird-watching travelogues into just 12 North American "birding hot spots," selected by Roger Tory Peterson from his wealth of experiences and described in appealing and useful detail by one who has worshiped at his feet.

The World of Roger Tory Peterson is "an authorized

Peterson's *Ruffed Grouse*, illustration from *The World of Roger Tory Peterson*.

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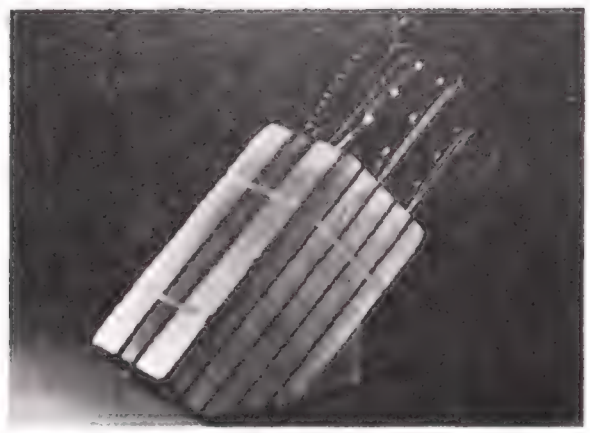

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biography" of the 69-year-old ornithologist by authors who are obviously on intimate terms with their subject. They are to be commended for their objectivity—the book could well be called "Everything You Wanted to Know about Roger Tory Peterson—Including Some Things You Found Too Awkward to Ask." They present a vivid picture of a very complex person, and have pulled few punches in the telling. They deal with his upbringing, his personal life and his successful roles as teacher, artist, writer, conservationist, photographer and traveler. They wisely make no direct effort at critical analysis—indeed, such an effort would lack credibility coming from biographers who refer to their man by his first name throughout the book.

He emerges as a living being, his extraordinary talents and capabilities well-attested to, and brought into perspective by fleeting but repeated reflections of a driving and self-engrossed personal ambition. The Peterson paintings that illustrate the book, admirable as they are, represent only one phase of his artistic work. All of them were done within the last ten years. It seems particularly regrettable that there are no examples from his field guides, which illustrate the Peterson method of bird identification, despite the fact that the authors justly note that this was perhaps his greatest contribution to birding. A final and perhaps parochial criticism focuses on the short shrift the authors give to Peterson's decade in Washington and the influences on his development of friendships and active association in the Audubon Society of the District of Columbia (now the Audubon Naturalist Society) with such naturalist leaders of the day as Rachel Carson, Louis Halle, Irston Barnes and Shirley Briggs. These criticisms notwithstanding, this is a book which all friends, admirers, and students of Peterson will read with interest and delight.

Roger Tory Peterson's Dozen Birding Hot Spots is a readable and detailed description of 12 major North American concentration points for bird observation. Other books on good birding places in America are available, most of which—from Olin Sewall Pettingill's *The Bird Watcher's America* and his guides to bird finding east and west of the Mississippi, to Robert W. Murphy's *Wild Sanctuaries,* Jessie Kitching's *Birdwatcher's Guide to Wildlife Sanctuaries,* and even Roger Tory Peterson's and James Fisher's *Wild America*—cover these 12 spots, along with many others, but none provides such thorough accounts of these exceptional areas. No others offer useful logistical information regarding motels, campsites, restaurants and rest rooms; none focuses so pointedly on the peak seasons for birding in these specific locations, and none contains illustrations of comparable quality. The bird photographs of George H. Harrison will seem to many ample justification in themselves for the purchase of this guide.

The book has been written for the amateur bird lister—that individual who is willing to spare neither money nor effort to find new birds to add to the all-important "life list." There is an almost frenetic tone in the writing, the author (and usually his wife) dashing by plane, hired car or their station wagon from one end of North America to another to catch the crucial moment at each "hot spot" when the maximum number of "listable" species might be passing through. "We totaled 32,693 miles getting to and from . . . Peterson's Dozen Birding Hot Spots. . . . We often drove more than 500 miles a day and on two occasions we topped 900 miles in one stint." This is hardly a program for the average bird watcher, however enthusiastic, even though it is reassuring to know that in 1975 American birds were still abundant enough in variety and in species populations to enable a knowledgeable observer with time, money, energy and motivation to record 402 species from 12 key locations. However, peripatetic bird listers are many in modern, accessible America. For them, this volume remains the most thorough and logistically helpful work of its kind.

—Edward F. Rivinus
Acting Director, Smithsonian Institution Press

George Rickey
Nan Rosenthal
(Harry N. Abrams, $45)

With the death in August, at 86, of the great Russian-born sculptor Naum Gabo, George Rickey, 70, can now be considered the world's leading exponent of Constructivism. Rickey had in fact dedicated his important 1967 book, *Constructivism, Origins and Evolution,* to Gabo.

Yet, despite their preeminence, the

names Gabo and Rickey are far less familiar to Americans than Alexander Calder or David Smith. With some bitterness, Gabo, in an interview with this writer in 1975, attributed this situation to the fact that, although a U.S. citizen since 1952, he was still identified as European by America's museums and critics.

Hirshhorn Museum and Sculpture Garden

Rickey's *Marsh Plant*, 28", 1962

This observation also applies to Rickey, an expatriate for more than two decades. Like Smith, who was one year his senior, Rickey was born in Indiana. However, at age six, his family moved to Scotland, and it was not until 1934, when he had already taken two degrees at Oxford and studied painting in England and Paris, that he moved back to the United States. Moreover, as Nan Rosenthal points out in her excellent essay, the sculptor's first major statement on the international art scene was made not in New York, but in Kassel, Germany, when the 35-foot-high, stainless-steel *Two Lines Temporal* was

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exhibited at Documenta III in 1964.

"Constructivism," Rickey has written, "is a familiar but elusive word in art circles." And very little heard of outside them, he might have added, although that is now changing rapidly. The movement had begun with a group of highly talented and radical artists working in Russia between 1913 and 1922; it included Gabo, his brother Antoine Pevsner, Kasimir Malevich and Vladimir Tatlin, all widely known "Russian names" today. The word "constructivism" is also used more broadly to classify objects that are built of parts rather than made by the more traditional methods of modeling or carving. It includes works formulated according to the geometric theories first expounded by Piet Mondrian and the famous "de Stijl" group of Dutch painters and designers.

Rickey's own contribution to Constructivism is as a kinetic sculptor who has created, without the use of motors or fabrication, several series of elegant, often monumental, statements that incorporate a "perpetual dialogue between order and randomness that lends fascination to the mechanics of motion."

Rosenthal's essay is particularly useful in its analysis of Rickey's working methods and of his relationships, personal as well as artistic, with Calder, Gabo, Smith and others. More than 200 illustrations, many in color (see example, p. 155), capture the details of individual sculptures and endeavor to provide the sense of motion intrinsic to their meaning. A cautionary note, applicable to numerous other volumes, must be sounded: while the ownership of each sculpture is carefully acknowledged, the location of an outdoor work as photographed is not given. Thus, *Summer III* in the collection of the Hirshhorn Museum and Sculpture Garden is seen at Joseph H. Hirshhorn's former home in Greenwich, Connecticut, while *Three Red Lines*, which dominates the museum's Mall entrance, is shown at George Rickey's studio in East Chatham, New York.

With Constructivism now drawing increasing attention from a widening American audience, this book appears at an opportune time. It should serve well to advance that interest.

—*Cynthia Jaffe McCabe*
Curator of Exhibitions
Hirshhorn Museum and Sculpture Garden

Pyramids of Life: Illuminations of Nature's Fearful Symmetry
John Reader and Harvey Croze, Foreword by Niko Tinbergen
(J. B. Lippincott, $12.95)

On safari in East Africa, most of us are overwhelmed by the marvelous vastness of the plains and the multitudes of big-game animals. A mixed herd of wildebeests and zebras graze on short grass; a giraffe nibbles the crown of a thorny acacia tree; a pride of lions dozes in long grass; a dung beetle rolls a small sphere at our feet and a griffon vulture circles high in the sunny sky. We don't see any pattern that relates the plain and the animals to one another. Least of all do we think of energy from the sun and nutrients from the soil captured by the grass and the acacia and then in turn flowing through the wildebeest, the zebra, the giraffe, the lion, the beetle and the vulture, and eventually returning to the soil to begin another cycle. But that pattern is the central theme of *Pyramids of Life* and it is introduced superbly in four pages at the beginning of the book.

Pyramids is a picture book, but a very serious and subtly scientific black-and-white picture book. Its message is that there are recurring patterns throughout the ecosystems of East Africa and all the components of those systems are interrelated. The dominant pattern is the fundamental ecological pyramid of unlimited energy from the sun combining with the water and minerals from the rocks and soil to make grass and other plants grow in profusion.

Herds of gazelles and other herbivores graze and browse, only to be preyed upon in turn by the occasional lion or other carnivores that lurk on the plains. The carnivores die and their carcasses are fed upon by scavenging vultures and other decomposers, including bacteria that eventually return the nutrient elements and the sun's trapped energy to the earth once more. Plants outnumber herbivores, which in turn outnumber carnivores and decomposers because when the plants are eaten, not all the energy is converted to animal matter; much energy is lost through heat.

The complex interrelationships of the system's components give it strength to rebound from the vicissitudes of nature's annual cycles and periodic disasters. But these interrelated components are, in

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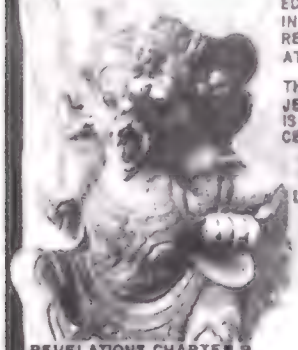

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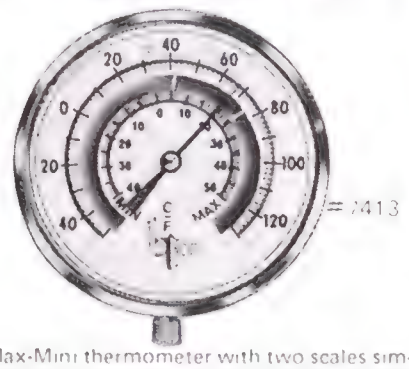

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A Reader photograph from the book

some cases, the system's inherent weakness that makes it highly vulnerable to destruction at the interfering hand of Man. This part of the story is only hinted at here and there in the book. For instance, if drainage from the town dump at Lake Nakuru were to cause disease or a fluctuation in the amount of algae that drastically reduced the number of *Tilapia* fish, the species structure of the elaborate fish-eating bird community would change.

The book is simply organized to look at the cycle of nutrients and pyramids of the three major ecosystems of East Africa —grassland, lakes and rivers, and forests. African grassland ecology is better understood than that of the wetlands and forests, and the emphasis in the volume reflects that fact. The three pyramids are visually expressed in a series of two-page spreads of John Reader's photographs and zoologist Harvey Croze's short essay captions using as blocks the four trophic levels—primary production, herbivores, carnivores and decomposers.

These are examined for each of the three ecosystems. Under primary production: controlling factors, basic food sources and modifying factors. And under the categories of herbivores, carnivores, decomposers: the pursuit of food, social organization, reproduction and avoiding predators.

Each two-page picture essay covers a single theme and often answers or attempts to answer an implied question.

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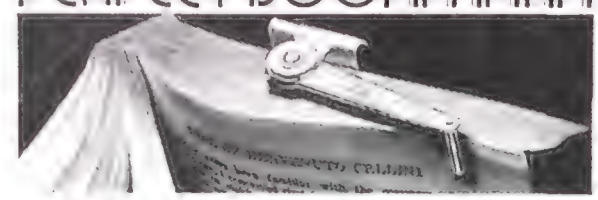

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How is the cheetah's hunting strategy related to its shape and gait? Can the facial pattern of the oryx reinforce use of its scimitarlike horns in defense? How does the matriarchal social system of the elephant ensure adequate food for the herd? Each question and answering essay makes one think of the broader application of the significant principle.

Reader's black-and-white photographs are all strong stuff. He has captured the images that one who goes on safari wishes he had seen.

Reader's images tell stories: the lion takes over the two cheetahs' wildebeest kill from which they had gulped only two bites, the jackal warns the vultures off a carcass, pelicans cooperate in fishing together. Drama is everywhere without the distraction of color. Even for a former *Life* and an occasional SMITHSONIAN contributor, these shots must have taken years to accumulate.

Croze's language is simple and comprehensible to the informed layman, yet the concepts are the cosmic ones of the ecosystem ecologist. One cannot look at and read this book without absorbing a better understanding and therefore a deeper appreciation of nature's grandest tropical ecosystems. I can unreservedly recommend *Pyramids of Life* equally to the armchair naturalist and to the itinerant naturalist.

—George E. Watson
Ornithologist, National Museum of Natural History, who has led Smithsonian Associates Study Safaris to East Africa

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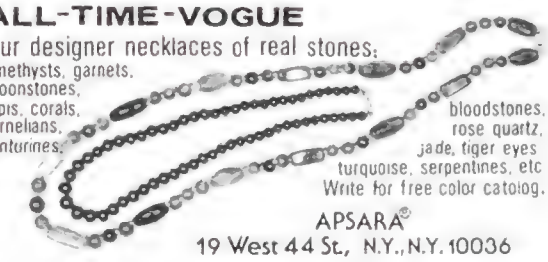

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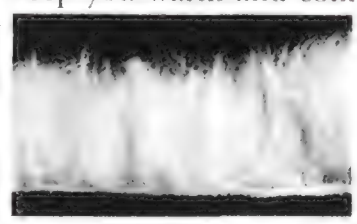

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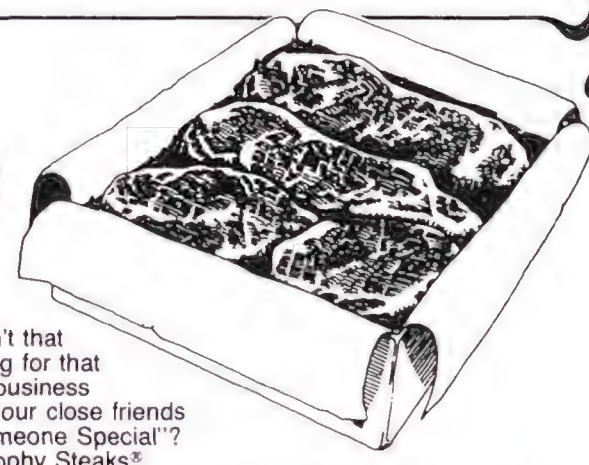

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Gordon and Breach, Science Publishers, Inc., 1974
The Cosmic Frontier of General Relativity by William J. Kaufmann 3rd, Little, Brown and Company, 1977
Black Holes, Quasars, and the Universe by Harry L. Shipman, Houghton Mifflin Company, 1976
The Iron Sun: Crossing the Universe Through Black Holes by Adrian Berry, E. P. Dutton & Co., Inc., 1977
The Cosmic Connection by Carl Sagan, Anchor Press/Doubleday, 1973

Animals in art (p. 108)
Animals and Men by Kenneth Clark, Thames & Hudson (London) and William Morrow Co., Inc., 1977
Birds, Beasts, Blossoms and Bugs: The Nature of Japan by Harold P. Stern, Harry N. Abrams, Inc., 1976
The Unicorn Tapestries by Margaret B. Freeman, Metropolitan Museum of Art, copublished by E. P. Dutton & Co., Inc., 1976
The Horse in Art by Margart Mallory, Santa Barbara Museum of Art, 1974

Gas Works Park (p. 116)
Seattle, Past to Present by Roger Sale, University of Washington Press, 1976
Skid Road by Murray Morgan, The Viking Press, 1952
Seattle: The Life and Times of an American City by Gerald E. Nelson, Alfred A. Knopf, Inc., 1977

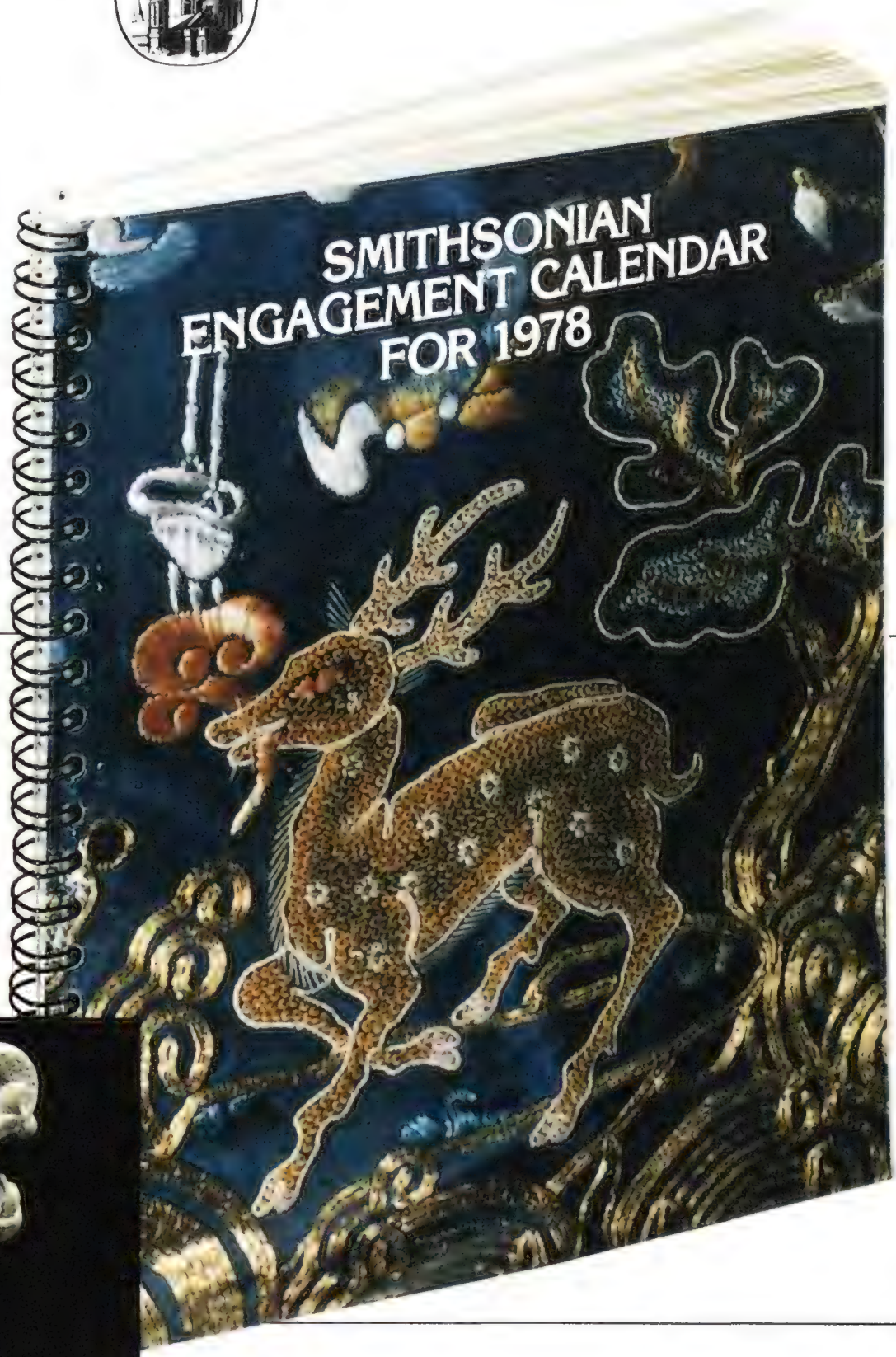
Horatio Alger (p. 122)
Holy Horatio by Ray Russell, Capra Press (Santa Barbara), 1976
From Rags to Riches by John Tebbel, Macmillan Publishing Co., Inc., 1963
"Horatio Alger, Pied Piper on America's Road to Success," *The Gallery*, January-February 1972
Alger, a Biography Without a Hero by Herbert Mayes, Macy-Masius, 1928

Hoboes (p. 141)
Hard Travellin': The Hobo and His History by Kenneth Allsop, The New American Library, Inc., 1970
The Hobo: The Sociology of the Homeless Man by Nels Anderson (1920), reprinted by Arno Press, Inc., 1969
Strikers, Communists, Tramps, and Detectives by Allan Pinkerton (1878), reprinted by Arno Press, Inc., 1969

Make this a special Christmas... with a gift from the Smithsonian.

THE 1977 SMITHSONIAN ASSOCIATES CATALOGUE, mailed earlier this fall contains a wide array of gift suggestions chosen expressly for Smithsonian Members. The following four pages show but a few of the exciting items offered in the thirty-two page catalogue. Be sure to see your catalogue for a broad selection of cards, books, glass and pewter reproductions, and gifts for children of all ages.

The items shown here and featured in the catalogue are based on artifacts in the Smithsonian's collections or have been created exclusively for the Smithsonian. As always, Smithsonian Associates receive the 10% discount as indicated by the Members' price. If you have not received a catalogue or would like another, please let us know. Just send your name and address to the Smithsonian Institution, P.O. Box 199, Washington, D.C. 20560.



COME JOURNEY WITH US THIS YEAR. Our inspiration for the beautiful 1978 Smithsonian Engagement Calendar comes from the kingdom of real and mythical animals. The Smithsonian collections have been thoroughly searched to create this exciting look at the animal world in all its variety. The 7 x 8 inch page size provides sufficient room for keeping track of a busy day. The perfect gift for many on your list. 525162 $4.95. $4.45 Members(.50).

A CHINESE DRAGON tomb figure from the Han Dynasty has been reproduced in Alvastone© 8" long. Our elegant dragon served as the inspiration for a 2-1/2" belt buckle and a pendant on a 22" chain. Sculpture: 316513 $45.00. $40.50 Members (4.00). Buckle: 420026 $10.00. $9.00 Members. (1.00). Pendant: 420034 $12.50. $11.25 Members (1.00).

Gift suggestions for Smithsonian Associates.

CAST A WARM GLOW with our lovely glass candlestick reproduction of an original in the Smithsonian collection. 5-1/8 inches tall. 316810 $17.00. $15.30 Members (1.25).

NAPPY. A pair of bowls for taste-tempting appetizers or desserts. Our nappy is a reproduction by Imperial Glass of an 1880's original in the Smithsonian collection. For additional pieces in the Broken Column pattern, be sure to see the 1977 catalogue. 4-1/2" in diameter. 333260 2 for $9.50. $8.55 Members (1.00).

THE HIRSHHORN TOTE. Rapidly becoming a design classic, this tote has been copied but never equalled. Fashioned in heavy canvas, it bears the great names of modern art. Measures a generous 16"H x 16"W x 7"D. 309781 $15.00. $13.50 Members (1.50).

AN ELEPHANT YOU WON'T FORGET. Our gentle elephant has been cast in pewter by Stieff. Based on a wooden sculpture found in 1919 during an African expedition sponsored by the Smithsonian in conjunction with a film company. 3"H x 4"L. 333179 $26.50. $23.85 Members (2.00).

FOR FLYING ENTHUSIASTS. Our official National Air and Space Museum tie features the Wright Flyer and the Spirit of St. Louis. Made of woven polyester in navy blue to wear with almost everything. 326983 $6.50. $5.85 Members (1.00).

CHICKADEES AND HOLLY. A classic theme from nature has been captured by the world famous Boehm Studios. Our gold-rimmed translucent porcelain plate is 10-3/4 inches in diameter. 333054 $37.00. $33.30 Members (3.00).

CHINESE CLOISONNE. The Chinese have long been known for their ability to fashion beautiful cloisonne items. Our lovely flowered cloisone beads are created by enclosing brightly hand enamelled areas with golden brass. Since no two beads are ever exactly alike we know you'll be pleased with the necklace we select for you. In creating these special necklaces we have used green jade and 14k gold fittings, and beads. **a.** An exquisite necklace for a very special woman. Centered by an oval cloisonne bead and the gentle glow of rose quarts. 24 inches. 420059 $165.00. $148.50 Members (7.00) **b.** A lovely round cloisonne bead bordered by jade. 16 inch length. 419515 $30.00. $27.00 Members (2.50).

A LUMINOUS BUTTERFLY. These iridescent glass tree ornaments have been created just for the Smithsonian. Each unique piece is signed, dated, and comes with a silken cord for wearing as a necklace. Approx. 2-1/2 inch wingspan. 419499 $45.00. $40.50 Members (1.75).

THE SMITHSONIAN SPOON. Our sterling silver Smithsonian coffee spoon bears the institution's logo on its handle and a view of the Castle in its bowl. Perfect for the spoon collector. 305011 $9.50. $8.55 Members (1.00).

BOUQUETS OF FLOWERS. The design of this delightful crewel pillow was inspired by 18th century bed hangings in the Smithsonian's collections. Our 15" square pillow kit reflects the variety of design motifs found on the original. 3 ply Persian wool, printed linen, backing, piping, zipper and instructions included. 333773 $11.00. $9.90 Members (1.00).

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Smithsonian highlights

During the holiday season the fascinating and sometimes ambiguous relationship between Man and animals will be the subject of exhibitions in two Smithsonian museums and at the National Zoo. The World Wildlife Fund is sponsoring all three as part of an international series (see p. 108).

National Zoo
"Sketch-Ins" will be opened to public participation on November 20, December 18 and January 15, 1978, culminating in an exhibition at the Zoo. Visitors will be invited to draw impressions of endangered animals; a selection of the drawings will be on display in January.

Museum of Natural History
About 60 photographs by Kjell Sandved depicting animals will be exhibited November 16 through January 15, 1978.

Hirshhorn Museum and Sculpture Garden
More than 50 paintings, sculptures and graphics reflecting animal themes and imagery will be drawn from the Hirshhorn's permanent collection, November 17 through January 15, 1977.

The Hirshhorn also offers films about artists on most Thursdays at noon and Saturdays at 1 P.M.; films by artist film makers on most Thursdays and Fridays at 8 P.M.; art films for young people on Saturdays at 11 A.M.; lectures on three evenings each month. For information call (202) 381-6264.

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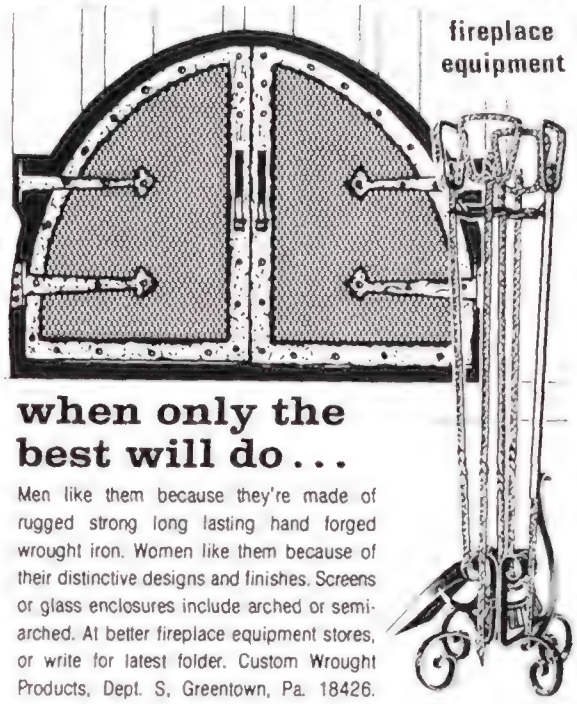

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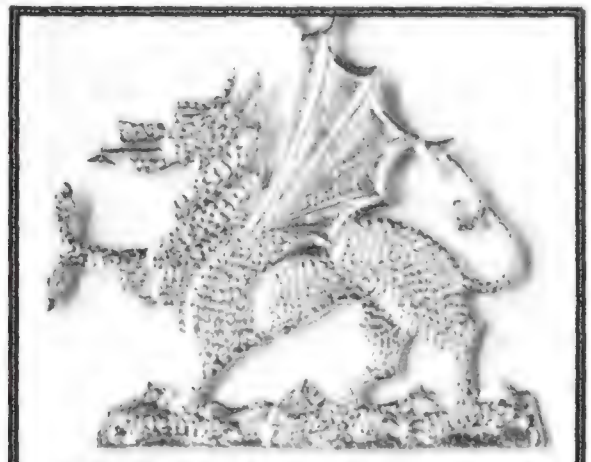

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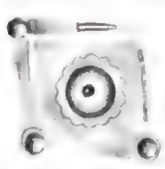

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show, will be presented every Friday, Saturday and Sunday evening in November in the Albert Einstein Spacearium at 7:30, 8:45 and 10 P.M. Lectures include "Earth Benefits from Tomorrow's Satellites," November 2; "Space Settlements," November 10; "The Extraterrestrial Imperative," November 16; and "Origin of the Solar System," November 30; all at 8 P.M. World War I aviation films will be shown November 3 and 9 at 7:30 P.M. in the museum's theater.

National Portrait Gallery
The Edouart Silhouette Room, a permanent installation, will open on November 15 with 71 pieces by the finest and most prolific creator of the silhouette, French-born Auguste Edouart.

Freer Gallery of Art
"Prophets and Kings in Persian Paintings," a lecture by Dr. Marie Lukens Swietochowski of the Metropolitan Museum of Art, will be offered, with illustrations, on November 8 at 8:30 P.M.

National Collection of Fine Arts
"The Paintings of Charles Bird King, 1785-1862" includes 50 pieces: oil portraits, drawings, prints and landscapes by Washington's principal artist from 1818 until his death, November 4 through January 22, 1978. On November 21 at 12:30 P.M. Melinda Anne Lorenz will lecture on George L. K. Morris.

Renwick Gallery
"William Harper: Recent Works in Enamels" provides a viewing of more than 50 pieces: pins, rattles, puzzles, pendants and amulets; opens November 24. "French Folk Art" continues.

On November 1, 2, 3 and 4 at noon the Jan Van Dyke Dancers will perform a choreography designed for the Renwick's Grand Ballroom. A concert of traditional American folk songs will be given on November 6 at 3 P.M. and French folk songs offered on November 27 at 4 P.M.

Traveling Shows
The NCFA show ". . . and there was light: Studies by Abraham Rattner for the stained-glass window, Chicago Loop Synagogue" will be at the Maurice Spertus Museum in Chicago through November 30.

The Renwick show "Craft Multiples,"

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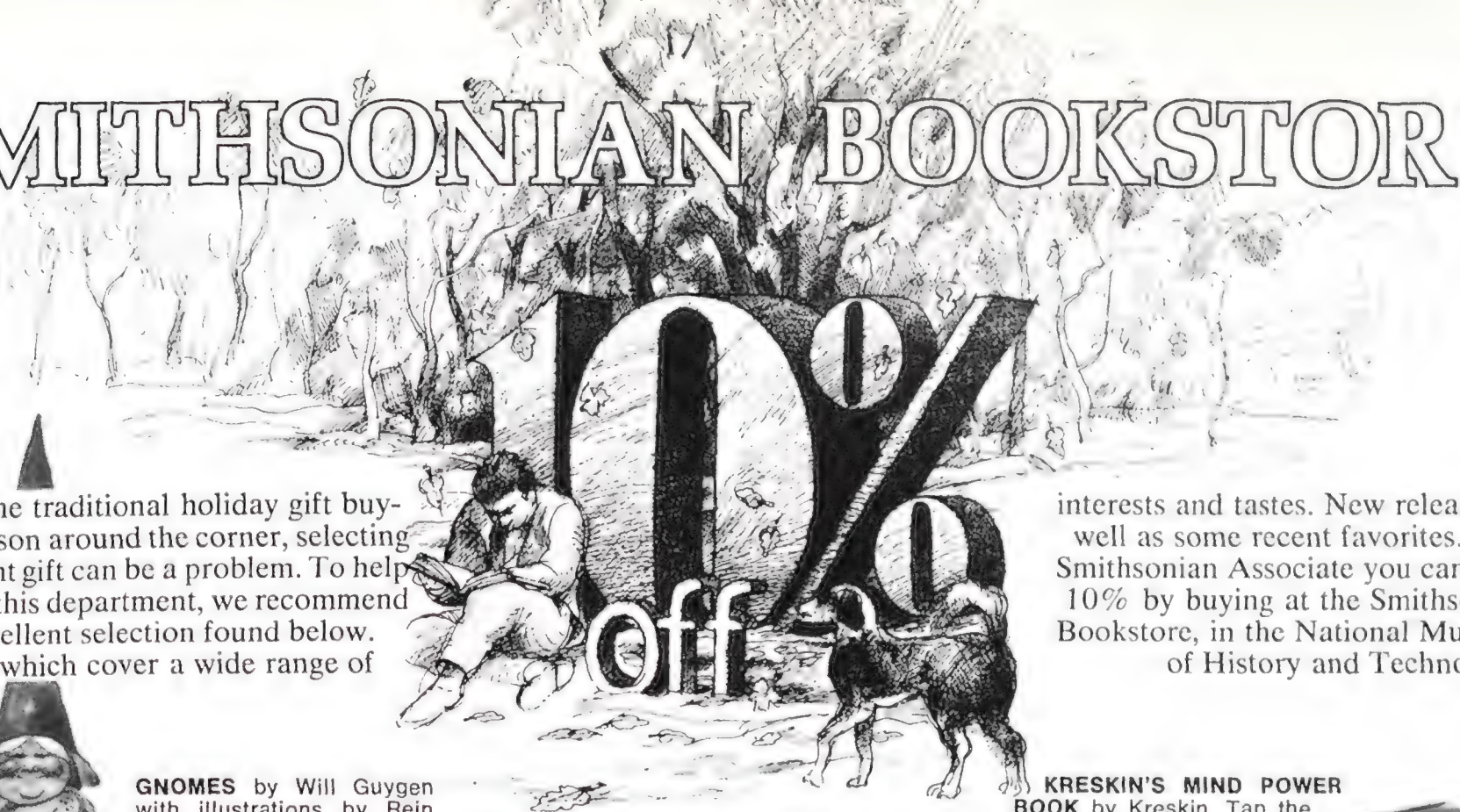

With the traditional holiday gift buying season around the corner, selecting the right gift can be a problem. To help you in this department, we recommend the excellent selection found below. Books which cover a wide range of interests and tastes. New releases as well as some recent favorites. As a Smithsonian Associate you can save 10% by buying at the Smithsonian Bookstore, in the National Museum of History and Technology.

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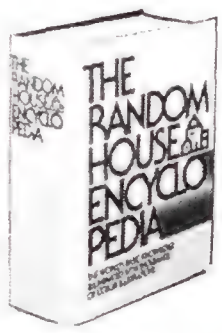

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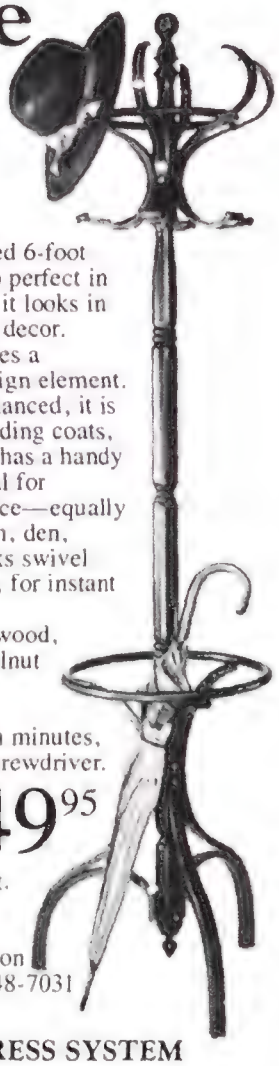

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Museum of History and Technology

"The Art of Pochoir" includes a range of examples of the decorative art of hand stenciling, continuing through December.

Division of Performing Arts and Musical Instruments

- On November 5, "Music from Marlboro," the first of two performances of the best from the Marlboro, Vermont, music festival, presents Beethoven and Mozart, plus Gounod's *Petite Symphony*, at 5:30 P.M., Baird Auditorium, Natural History Museum.
- On November 6, Dexter Gordon will play tenor saxophone in the Jazz Heritage series at 8 P.M. in Baird Auditorium.
- On November 13, a one-man tradition in current Blues idiom, Mose Allison, will play piano and sing at 8 P.M., Baird Auditorium, Natural History Museum.
- On November 14, an evening of chamber music by Aston Magna, performed on baroque instruments under the direction of Albert Fuller, at 8:30 P.M. in the Hall of Musical Instruments, Museum of History and Technology.
- On November 18, "Country Music and Dance," provided by the Plank Road Stringband with a dance caller from the Green Grass Cloggers, will begin at 8 P.M. in the Hall of Musical Instruments.
- On November 27, Alec Wilder and Friends will play the music of Rodgers and Hart and Cy Coleman with vocalist Teddi King, at 8 P.M. in Baird Auditorium, Museum of Natural History.
- On November 28, "The Singing Master's Assistant," an evening of singing in the style of the 18th-century Yankee singing school, will begin at 8 P.M. in the Hall of Musical Instruments.

For information call (202) 381-5395.

When Associates visit Washington

Upon arrival at the Smithsonian, members are invited to register at the Associates Reception Desk in the Smithsonian castle on the Mall. Here, from 10 A.M. to 4 P.M. daily, special orientation materials may be obtained.

Associates planning a trip to the Smithsonian may send a postcard or call for an information packet: Associates Reception Center, Smithsonian Institution, Wash-

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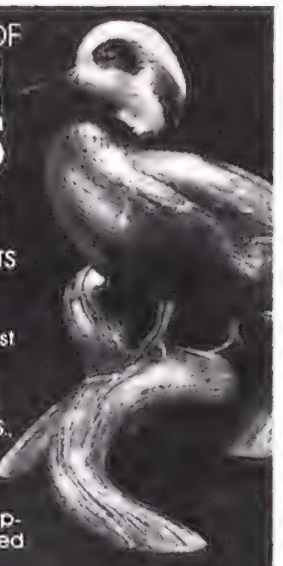

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If you have misplaced your membership card, the Associate receptionist in the castle will issue a replacement upon presentation of your Smithsonian magazine address label.

Contributing Memberships

Contributing Members of the Smithsonian Associates support the Institution's work in education, research and scholarship. There are three categories of membership: supporting at $50, donor at $100, and sustaining at $500. Among the special privileges offered to contributing members are:

- Illustrated exhibition publications by Smithsonian scholars
- Invitations to selected previews of major exhibitions

National Contributing Members receive advance notice and illustrated publications about Smithsonian Traveling Exhibitions and complimentary tickets for Regional Program activities in their area. Contributing Membership is tax-deductible within the limits of the law. For more information, please write Contributing Membership Program, A & I Building 1208, Smithsonian Institution, Washington, D.C. 20560.

The Court

The Court, the Associates dining facility, is located in the Museum of Natural History. Breakfast service continues on Saturdays and Sundays only, 8:30 A.M. until 10 A.M., with entrance via Constitution Avenue. Cost for adults is $2.95; for children, $1.95.

Luncheon is served seven days a week, 11 A.M. until 3 P.M.; cost is $3.95 for adults, $2.95 for children.

Holidays in the museum shops

Each museum shop carries items relating to the collections in that museum. Around Christmastime, special gifts, toys, tree ornaments and cards from around the world are available in the shops. Associates are entitled to a ten percent discount with a membership card in most museums.

Winter museum hours

The Smithsonian museums are open 10 A.M. to 5:30 P.M. daily. The Zoo is open from 9 A.M. to 4:30 P.M. and the Anacostia Neighborhood Museum from 10 A.M. to 6 P.M. weekdays and 1 to 6 P.M. weekends.

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It's an anniversary—SITES' 25th

For 25 years the Smithsonian Traveling Exhibition Service (SITES) has been moving about America, complementing the collections of state and local museums and transforming libraries, schools and banks temporarily into museums housing a bit of the Smithsonian Institution for about a month at a time. SITES draws material from many sources, including private collections and other museums, to create its shows, constantly expanding the possibilities open to museum-goers throughout the country.

SITES has recently organized its 1,000th exhibition (each exhibition tours for about two years, stopping in an average of 12 communities): "Folk Art and Crafts—The Deep South." The folk arts tour opened in three cities with a presentation of 15 craft objects, supplemented by panels of photography and text. The text includes an interview with sculptor James "Son Ford" Thomas: "My work is a shape of something that has never been presented. . . . I guess you'll run many miles in many parts of the world and never see anything shaped like that."

SITES offers three styles of shows; each requires a different kind of security and rental fee. For information about a show that fits your organization's need, write: Eileen Harakal, Smithsonian Institution, Washington, D.C. 20560, or call (202) 381-6631. Many of the shows opening in November follow:

The Southeast

• Tuscaloosa, Alabama—"The Sculpture of Jacob Epstein" offers 35 emotionally explicit bronze portraits, University of Alabama Art Gallery, November 19-December 18.

• Pensacola, Florida—"The Five Sense Store: An Aesthetic Design for Education" presents an attempt to integrate the arts into the elementary and secondary school curriculum, Pensacola Art Center, November 5-December 18.

• Tampa, Florida—"Antwerp Drawings and Prints from the Sixteenth and Seventeenth Centuries," Tampa Bay Art Center, November 5-December 11.

• Murray, Kentucky—"Know What You See: the Examination of Paintings by Photo-Optical Techniques" focuses on the art conservator's methods, Murray State University, opening November 26.

• Charlotte, North Carolina—"Ride On!" offers a glimpse at the history of the bicycle, Mint Museum of History, November 26-January 15, 1978.

• Charleston, South Carolina—"America's First Ladies" is a show of 42 photo panels providing images of every woman who served as First Lady, The Citadel Archives-Museum, opens November 12.

• Greenville, South Carolina—"America Underfoot: A History of Floor Coverings from Colonial Times to the Present," Greenville County Museum, November 19-December 18.

The Midwest

• Cahokia, Illinois—"Photographing the Frontier," Parks College, November 19-December 18.

• South Bend, Indiana—"American Agriculture: A Continuing Revolution," Discovery Hall, November 1-December 4.

• Mt. Vernon, Iowa—"Witness to our Time: Alfred Eisenstaedt," Cornell College Commons, November 5-December 3.

• Logan, Kansas—"America's First Ladies," Dane G. Hansen Memorial Museum, November 12-December 11.

• St. Paul, Minnesota, "The Tallgrass Prairie: An American Landscape," Farmers Union Grain Terminal Association, November 12-December 11.

• Kansas City, Missouri—"And the Band Played On," Mid-American Arts Alliance, November 1977-November 1978.

• Grand Island, Nebraska—"The Tallgrass Prairie: An Amercan Landscape," Stuhr Museum of the Prairie Pioneer, November 12-December 11.

• Columbus, Ohio—"Treasures of Cyprus," Columbus Gallery of Fine Arts, November 18-December 31.

The Northeast

• New Haven, Connecticut—"In Quest of Cockaboody: The Animated Films of Faith and John Hubley," Yale University School of Art, November 12-December 11.

• Vineland, New Jersey—"Hey! Look at Me," combines a color film with the artwork and poetry of inner-city children, Cumberland Community College, November 14-December 15.

• Utica, New York—"Edvard Munch: The Major Graphics," Munson-Williams-Proctor Institute, opens November 19.

• Lincoln University, Pennsylvania—"The Black Presence in the Era of the American Revolution, 1770-1800," Langston Hughes Memorial Library, November 12-December 11.

The West

• Hayward, California—"And the Band Played On," Chabot College Library, November 5-December 3.

• Denver, Colorado—"American Agriculture: A Continuing Revolution," First National Bank of Denver, November 5-December 4.

• Greeley, Colorado—"America's First Ladies," Greeley Museums, November 12-December 11.

• Carson City, Nevada—"Ride On!" presents a short history of the bicycle, November 26-December 25.

• Kempfield, California — "Salzburger Festspiele!" exhibits 23 costumes used in the Salzburg music and drama festival, November 5-December 4.

Salzburg Festival costume is appearing this month in Kempfield, California.

FOKKER T-2

Pilots Lts Oakley G. Kelly and John A. Macready

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The Fokker T-2 made the first nonstop U.S. transcontinental flight on May 2 and 3, 1923. It covered the 2,520 miles from Roosevelt Field, Long Island, New York, to Rockwell Field, San Diego, California, in 26 hours, 50 minutes and 38 seconds. The Fokker T-2 is now a part of the Collection of the National Air and Space Museum.

The Fokker T-2, the aircraft that made the first nonstop U.S. transcontinental flight in 1923, has been completely restored and is exhibited in the new National Air and Space Museum. The historic original fabric, which was replaced during the restoration, is now available to the public. The best portions of the fabric have been cut into squares and mounted on handsome 15 X 20" posters.

The Fokker T-2 poster, the fourth of the Aviation Relic Series, will make a unique gift. Worthy of framing, this piece of history is a collector's item.

Information regarding the first and third posters in this series, the Douglas World Cruiser and the Curtiss NC-4, may be obtained by writing to the address below. The second poster is no longer available.

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The unique gowns of the First Ladies of the White House are presented in this set of 42 slides. Literature identifies each gown, its fabric and style. Sets are $20.

Suiting Everyone

Based on the exhibit "Suiting Everyone" in the Museum of History and Technology. This set of 80 slides presents a broad cross-section of clothing in America, from the 18th c. to the present, ranging from ordinary work clothes to exquisite formal wear. Sets are $20.

Musical Instruments of the Baroque and Early Classical Eras

This set of 57 slides illustrates fine examples of instruments from the Smithsonian collection. Two audio cassettes are included: an accompanying narrative and Baroque works performed on instruments of the period. Sets are $25.

The Battle of the Little Bighorn

The story of this controversial battle is presented in this set of 80 slides. Includes life portraits of participants, a series of drawings by Red Horse and artifacts from the time. Background account, captions and map included. Sets are $25.

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Exploring the World with the Smithsonian

For both the seasoned and would-be traveler, the Smithsonian has developed a travel program to meet a variety of tastes and budgets. In an effort to meet the increasing growth and interests of Smithsonian Associates, the tour programs have expanded, bringing travelers to places reflecting the Institution's interests. Whether the destination be a foreign land or a site in the United States, the Smithsonian has planned an intriguing, educational experience, and often an adventure. Smithsonian personnel evaluate the travel offerings and accompany all trips.

Three types of trips are available, Study, Charter and Domestic, each with its distinct character. Foreign Study Tours provide small groups with culturally oriented, specialized trips, under the guidance of museum curators, or experts in respective fields. Foreign Charter Tours are larger (they are broken up into several small groups under the leadership of skilled guides and interpreters), lower in cost, combining study, discovery and vacation. Domestic Tours offer specialized guidance and expertise of a kind generally unavailable to persons traveling on their own.

**Predeparture lectures and courses are optional on many of the foreign tours.*

Foreign Study Tours

Egypt and Petra via Red Sea—January 30-February 9, 1978: Plane via London to Cairo, board MTS *Argonaut* at Suez for Red Sea, visiting Luxor from nearby port before cruising on to Jordan for Petra.

Himalayan Cultures—March 4-27, 1978 Delhi, Agra, Calcutta, Darjeeling, Nepal, including tigers and Everest viewing, and Bhutan for a five-day exploration.

Gods and Gardens in the Western Mediterranean—April 29-May 15, 1978: Cruise on MTS *Argonaut* from Rome to Lisbon, visiting Roman and medieval centers of civilization at Pisa and Lucca in Italy and Arles, Aigues-Mortes and Carcassonne in France, spring gardens at their height, plus Barcelona's museums and architecture, Moorish Spain and Tangier. The guest lecturer will be A. Hyatt Mayor, Curator Emeritus, Print Department, Metropolitan Museum of Art.

Thomas Jefferson in England and France—July 9-30, 1978: His travels retraced, with emphasis on country houses and gardens he admired plus appropriate areas and houses in London, Paris and Nîmes; led by Professor Frederick Nichols of Charlottesville.

Aegean Sites of Civilization—October 7-29, 1978: A cruise on MTS *Argonaut* with Dr. Richard H. Howland, including Thrace, Istanbul, Troy, Ionia, Mt. Athos, Mistra, Thera, Crete and principal classical sanctuaries, leaving from and returning to Athens. *Optional prelude may be the following:*

Nostalgic Orient Express—October 2-8, 1978: vintage cars restored to superb condition, over original Simplon routing from Zurich to Athens; brief stops for sightseeing at Venice, Ljubljana, Skopje, Thessalonica, and the spectacular Meteora monasteries.

For detailed information write Miss Bliss Schumann, Foreign Study Tours, S.I. 123, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5520.

Foreign Charter Tours

Mayan Mexico: The Yucatán Peninsula—January 6-18, January 28-February 9, November 10-22 or December 2-14, 1978: A complete tour of the extraordinary Mayan ruins of the Yucatán. Accompanied by an archaeologist, visit the sites of Chichén Itzá, Palenque, Uxmal, Tulum, plus the seldom-visited sites of Edzna, Kohunlich, Rio Bec and Cobá. Also includes a brief pause at Akumal on the Caribbean Sea. An adventure tour. (Originates in Mérida.)

Guatemala—November 22-December 2, 1978: In the company of an archaeologist, visit Tikal, the monumental Mayan city of the Petén jungle; Copán, a Mayan site deep in the mountains of Honduras; plus the Mayan ruins of Quiriguá, El Baúl and La Democracia. Travel to the Guatemalan Highlands to visit Lake Atitlán and Antigua —the Spanish colonial capital preserved in its 17th- and 18th-century splendor. Also visit Chichicastenango with its ancient market and Indian rituals. Guatemala is a must for Mayan archaeology and Indian textiles. An adventure tour. (Originates in Guatemala City.)

Kenya, East Africa—February 2-19: Wildlife and tribal life adventure providing modern African insight—and the "Africa that used to be," in the old safari tradition. Seminars in Nairobi and in field areas of Masai Mara; Samburu; Tsavo.

Italy*—May 1-15: The complete Rome plus choice of travel seminars to Florence, Venice or Campania; museum seminars; walking tours of ancient sites; Baroque churches and Renaissance palaces in Rome; excursions to Tivoli, Ostia Antica, Etruscan ruins, or along the Appian Way.

Russia*—May 8-22: Leningrad, Tallinn and Moscow; see the Hermitage and Tretyakov Museums, the palaces of Pushkin or Petrodvorets; life-seeing visits to schools, factories or clinics; attend the Russian theater and circus.

Paris and Provence*—May 15-29 or September 4-18: Paris plus Avignon, Arles, Nîmes and Aix-en-Provence; museum seminars at the Louvre and the new Pompidou center; walking tours of the islands of the Seine; excursions to the Loire, Chartres or Reims.

Scotland*—September 25-October 9: Edinburgh and beyond—a program of walking tours and special visits in Edinburgh; visits to castles, abbeys, battlefields and archaeological sites, plus incomparable scenic beauties of rugged mountain glens and rolling hillsides throughout the Highlands and Lowlands of Scotland.

The Caucasus: Armenia, Azerbaijan and Georgia*—October 9-23: The spectacular mountain scenery of Transcaucasia; the ancient cities of Erevan, Tbilisi and Baku; medieval churches and mosques; the Caspian Sea and mountain fortresses.

Low cost of tours includes first-class hotels, most meals, sightseeing, lectures, theater tickets and air fare. *Optional predeparture course will be available. Write Smithsonian Associates Travel Program, A&I 1270 B, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5635 for details.

Domestic Study Tours

Christmas at the Smithsonian—December 9-11: Sixth annual Christmas weekend with traditional tree-trimming party and holiday festivities. Special program at the Renwick Gallery; private viewing of the First Ladies' gowns and Presidential china; behind-the-scenes tours in the Smithsonian castle and National Zoo.

Membership Benefit

Plan Now For 1978

Colonial Crafts—January 18-22: Learn about 18th-century crafts such as graphic arts, woodworking and textiles, through an in-depth program of special lectures, films and demonstrations by Williamsburg's skilled craftsmen.

Victorian Washington—January 27-29: A fascinating program of lectures and neighborhood walking tours to learn about the city's 19th-century architecture and history.

Baja Whale Watch—February 18-25: Travel by chartered sport-fishing boat from San Diego to San Ignacio Lagoon; study the California gray whale and other marine life through observation, on-site lectures; hike on deserted islands, study the Baja plant and bird life.

Yellowstone in Snow—February 24-March 5: Explore Jackson, Wyoming, in the shadows of the magnificent Tetons; discover Yellowstone in the peace of its winter season, learn about the wildlife of the park and the surrounding region.

Virgin Islands Adventure—March 31-April 9: Explore the British and U.S. Virgin Islands by chartered sailboat to learn about the spectacular natural history in these warm, tropic waters.

New York City—April 14-17: A repeat of the sell-out weekend in November. The program includes special art tours to the Cooper-Hewitt, Metropolitan and Whitney Museums and performances of opera and theater.

Big Bend National Park—April 29-May 6: A nature tour of this Chihuahuan Desert wilderness park in southwest Texas, with its spectacular canyon scenery and abundant wildlife.

Washington "Anytime" Weekend—Visit the nation's capital and tour the original Smithsonian building. Spend two nights at Loew's L'Enfant Plaza Hotel (reservations required ten days prior to weekend).

The Magnificent Tetons—June 1-11: In cooperation with the Teton Science School, explore the beautiful backcountry of the National Park.

For information write Smithsonian Associates Travel Program, A&I 1270 B, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5635.

The thinking person's guide to slide projection.

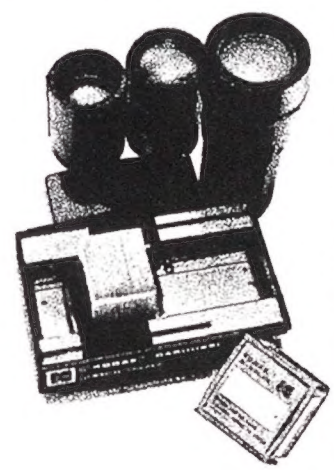
It's an exciting moment when you can really start enjoying the rich, dramatic beauty of your own color slides. There's nothing like seeing them projected. Which is why you should consider one of the many Kodak Carousel projectors. They are available with a curved field projection lens for sharper edge-to-edge projection.

They treat your slides gently.

Every Kodak Carousel projector uses gentle dependable gravity to drop each slide into place. They're all easy to use. And all now come with the Kodak Carousel Transvue slide tray with illuminated slide numbers so you can always locate a slide, even in the dark. Kodak Transvue slide trays make slide storage easy, too.

Different controls for different requirements.

Kodak Carousel projectors are available in a variety of models. Many models offer remote control slide change—both forward and reverse. Some models give you automatic focusing; and some models even offer automatic slide changing at selected intervals.



Know what your future options can be.

Everything from special-purpose lenses, stack loaders and slide clips, to special "presentation aids" for slide-to-tape synchronization are available for use on most Kodak Carousel projectors.

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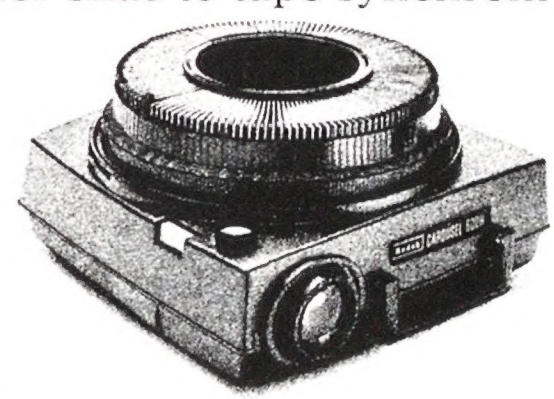
Price is subject to change without notice.



Kodak Carousel projectors

By Patrick Ryan

Dirty jobs that require more clean sweeps

© 1930, The John C. Winston Company

"Tom found out that he was dirty."

If you have an odd feeling that you've been seeing more chimney sweeps lately, don't let it bother you. On the reputable word of the *Christian Science Monitor*, "The resurgence of wood-burning stoves and fireplaces in America is bringing a dying trade back to life. The estimated 100 chimney sweeps across the country are busier than ever, a guild has been formed to train new sweeps, and the ranks are beginning to swell. . . . More and more of the nation's 25 million fireplaces and woodstoves are being rekindled with firewood as an alternative to high-priced fuel oil."

All admirers of Mary Poppins will be gratified to learn that many members of the sooty guild still array themselves for business in the traditional "Chim Chim Cher-ee" livery of top hat, black tails and tattered, sooty scarf. This uniform dates back to the 16th century in Europe when chimney sweeps were the town paupers and wore frayed hand-me-downs cast off by the local undertakers. Conscription of the destitute into the flue-scraping trade was confirmed by Charles Dickens when Oliver Twist narrowly escaped being handed over by the workhouse board as an apprentice chimney climber to Mr. Gamfield, the master sweep, along with a premium of three pounds ten shillings. A particularly fortunate deliverance, since Mr. Gamfield averred that the most humane way of bringing a boy down from a chimney was to light up a good hot blaze, "acause, even if they've stuck in the chimney, roastin' their feet makes 'em struggle to hextricate theirselves."

Further Victorian literary attention to the hard lot of the chimney boys was drawn by Charles Kingsley in his classic children's story, *The Water-babies*. His juvenile hero "was a little chimney-sweep and his name was Tom," who "cried when he had to climb the dark flues, rubbing his poor knees and elbows raw; and when the soot got into his eyes, which it did every day in the week, and when his master beat him which he did every day in the week." Fortunately, while wriggling through the smokeways of Harthover House, Tom suddenly descended in full occupational blackface into the virginal bedroom of the little daughter of the house. At her shrieks of horror, he fled through a window and eluded the following hue and cry by tumbling into a stream and subsequently taking an allegorical and submarine journey to the sea and happiness.

International connoisseurs of domestic decarbonization will be struck by the *Monitor's* judgment that in the United States, "Amazingly, the technology of cleaning chimneys remains stuck in the Middle Ages. The sweep must still climb to the roof, lower a weighted brush down the chimney by rope, and collect the pile of sooty scrapings left behind in the fireplace." It is a wonderment how these heavy-laden and tile-traversing mountaineers manage to keep both their footing and their top hats on.

In transatlantic contrast, the unheroic British sweep works in quite the opposite direction. He just walks in the front door, settles comfortably on the carpet and operates from the bottom up. His ascendant equipment consists of a bundle of flexible, screw-in rods which, successively connected, propel the scouring brush up the flue until it triumphantly breaks daylight above. At which effete success, achieved without endangering life and limb at chimney-pot pinnacle, he says. "Well, ma'am if you press me, then I will have another cup of tea." Little wonder his countrymen lost that American War of Independence.

Although Shakespeare, in his rare mention of their trade, took the doomful view that "Golden lads and girls all must/ As chimney-sweepers, come to dust," popular folklore holds that a sweep is a lucky person to meet by chance. Some hold that he should be bowed to and greeted respectfully; others believe that if you first spit, and then wish on seeing him, your wish will be granted.

Any member of the guild who, despite his outward aura of good fortune, finds himself stuck up on an icebound roof with his weighted brush jammed solid halfway down the flue, may be grateful for advice that the heavenly authority to whom he should pray for miraculous intervention is St. Florian, who was sadly martyred by drowning in A.D. 304. St. Florian is registered as the patron saint of both chimney sweeps and soapboilers, and thus serves to preserve his duskier clients when about their grimy duty and, afterward, to ensure that they are provided with the detergent means to make themselves as immaculate as Tom, the amphibious chimney boy, became in his happy end.

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